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ART. I. *Observations of the Remedial Effects of the Balsam of Copaiba in Catarrh and Irritability of the Bladder, and in Leucorrhœa; with Cases.* By R. LA ROCHE, M. D. of Philadelphia.

CHRONIC catarrh of the bladder is generally, as every practitioner must be aware of, a dangerous and often a highly painful disease. In many cases it is of a secondary nature, arising from organic degeneration of the various coats of the bladder, from the presence of foreign bodies in the cavity of that viscus, or from diseases of the annexed organs; while in other instances, the cause of the formation of the fluid discharged is to be sought for in a chronic irritation of the mucous follicles or of the substance of the internal lining of the bladder—the sequel of acute inflammation, the effect of a translation of irritation from some other organ, or the result of the suppression of a gonorrœhal discharge. It is evident that in the former class of cases,—those in which the disease is secondary or symptomatic, little benefit can be expected from the employment of means directed against the chronic irritation—the immediate cause of the increased secretion; inasmuch as before this morbid state can be corrected, the remote cause, the original disease, must, if possible, have been removed. If such means are occasionally found advantageous, they act only as palliatives. In those instances, however, in which the catarrhal symptoms arise from a simple and primary chronic secretory irritation of the lining membrane of the bladder, and in which the disease assimilates to catarrhal inflammations of other organs, the case is very different, and the object of the practitioner should be to select such remedies as are calculated to remove the morbid state in question.

To present a monograph of catarrh of the bladder—to offer an account of the symptoms, causes, nature, and treatment of that disease, might doubtless prove interesting and useful to some of the readers, and is a task which, though not devoid of difficulty, I should gladly undertake. But as it would occupy more time and space than can be conveniently spared on the present occasion; and as, in fact, it is rendered to a certain extent unnecessary by a reference for valuable information on those subjects, to works of easy access, I shall abstain from entering into details upon them, and leave the task to other hands, or postpone it to another and more proper occasion. The object of the present communication, will be to lay before the reader some facts in relation to the effects of the balsam of copaiba in the treatment of the disease above-mentioned, and to show that, if properly administered, and if the cases are carefully selected, this remedy will be found highly efficacious, as a curative means, in a large proportion of cases of the primary form of the complaint, and may be prescribed, as a useful palliative, when the symptoms arise from a secondary derangement of the affected membrane. In presenting the results of my experience on this subject, it is very far from my intention to lay any claim to novelty of practice; for I am fully aware that the balsam of copaiba has long been employed and recommended in this disease, and that it is frequently mentioned in various publications we possess on the diseases of the urinary organs and on the materia medica, as well as in many periodical works of the last and of the present centuries. Cartheuser* remarks that the copaiba is useful in ulceration of the bladder; a condition of tissue which, at the time he wrote, was almost universally thought to exist whenever there occurred a discharge of mucous or purulent matter from any part of the body. Hoffman† speaks in high terms of its effects in the same complaint. At a much later period, Dr. Stroem‡ related a remarkable case of the disease which he treated successfully by means of the same remedy. The copaiba was likewise used with complete success by Dr. Bretonneau, of Tours, in a case of chronic inflammation of the lining coat of the bladder, brought on by the discharge into that organ of the contents of an abscess situated in the neighbourhood.§ Mr. Cumin, in the article Cys-

* Materia Medica.

† Obs. Phy. Chim. p. 24.

‡ Rapport sur les Travaux de la Sociéte Médicale de Suède. Bibliotheque de Therapeutique, 1. p. 412. Diction. de Mat. Med. 2. art. Copahu.

§ Velpeau—Mémoire sur l'Emploi du Baume de Copahu en Lavement. Arch. Générales de Méd. 13, p. 44. Bibliotheque de Therap. 1. p. 389.

titis, contained in the London Cyclopedia of Practical Medicine,* remarks that in cases of the disease occurring in enfeebled constitutions or scrofulous habits, the balsam of copaiba is used with greater advantage than astringents or the other stimulants of the urinary organs. Ribes† employed it with success in cases of the disease resulting from suppressed gonorrhœa. Barbier, of Amiens,‡ and Lallemand, of Montpellier,§ speak of it as of a useful remedy in catarrh of the bladder. Chrestien,‖ the author of a remarkable work on the Iatraleptic method, prescribed it in combination with turpentine, in small and repeated doses; and, finally, the late Professor Delpech, of Montpellier,¶ remarks that he has succeeded in the most satisfactory manner in curing, by means of the copaiba, the gonorrhœal inflammation of the bladder, even when the disease was of long standing and had already assumed a very formidable character. This distinguished writer relates several cases of the kind, and makes the following remarks, which show the value he attached to this remedy in the treatment of the disease in question. "Even did we think it proper to renounce the use of these two remedies, (the bals. copaiba and cubebs,) in order to combat by ordinary means simple gonorrhœa—a practice which we are very far from regarding as justifiable, we should not the less persevere in the use of them in so serious a complaint, (catarrh of the bladder,) and thereby prevent the incurable infirmity which is the least of the evils to be apprehended from it."

The circumstance of the copaiba being spoken of by many physicians of high repute, as a useful and even efficacious remedy in the disease which forms the topic of these remarks, may perhaps be regarded by some as sufficient to render further details on the subject unnecessary. Nevertheless, when it is borne in mind that by a very experienced practitioner, Dr. Ferrus,** and several other writers, the remedy is represented as far inferior to turpentine in that complaint; that by many physicians who have published their views relative to the treatment of the latter, no mention at all is made of copaiba; and that it is often neglected in Europe and this country by those who can have no reasons to fear or doubt its effects, the reader

* Volume 1, p. 505.

† Bulletin de la Société Méd. d'Emulation, Sept. 1822, p. 349. Biblioth. de Therap. 1, p. 359, &c.

‡ Mat. Med. 2, p. 120. § Maladies des Voies Urinaires.

‖ L'Huillier—Thèse sur le Catarrh de la Vessie, Montpellier, 1826, p. 22.

¶ Clinique Chirurgicale de Montpellier, 4to. vol. 1, p. 271. Revue Médicale, 403. Biblioth. de Therapeutique, 1, 370.

** Dict. de Méd. vol. 6, p. 331.

will at once perceive the propriety of adding such facts to those already before the public, as appear likely to corroborate what has been said by preceding and contemporary writers on the subject of its remedial virtues.

Of the several cases of catarrhal irritation of the bladder in which I have myself resorted to the copaiba, or seen it used by others, I shall only offer the details of three, which appear to be sufficiently interesting to deserve a notice, and well calculated to demonstrate the efficacy of that remedy.

Case I.—A French gentleman, about sixty years of age, long a resident of this city, was seized in the year 1822, without any assignable cause, with acute inflammation of the bladder. By means of antiphlogistic and emollient remedies, which were prescribed by the attending physician, the late Dr. Monges, the most violent and inflammatory symptoms were in a few days subdued, and in a short time the patient was sufficiently relieved to leave his bed and even his room. Nevertheless, the disease was rather mitigated than effectually cured. The irritation assumed the chronic form, and was attended with a copious secretion of mucoso-purulent matter, frequent desire to make water, some difficulty in passing it, and pain at the neck of the bladder. As, however, the patient suffered much less than he had done at the commencement of the attack, and as he had recovered some strength and appetite, he fancied that his complaint was of very slight importance, and completely devoid of danger, and that it should therefore be left to the powers of nature. In conformity with these notions, after making use, during a short time, of appropriate remedies, he positively refused to adhere to any plan of regimen, or to follow any method of treatment. Of the impropriety of this course, however, he soon had a distressing proof, for before a week had elapsed, the pain, difficulty of making water, frequent desire of voiding that fluid, and the other symptoms became considerably aggravated; in short, the patient experienced a complete relapse. By a timely application of the means above enumerated, and which were now prescribed by Dr. Monges and myself, the inflammatory symptoms were once more subdued, and the irritation again assumed the chronic suppurative form. An examination was now made, which enabled us to ascertain that the prostate gland was slightly enlarged, but that the urethra was free from obstruction.

The aggravation of the disease, resulting evidently from a total neglect of the remedial and hygienic means recommended, together with the pain he experienced, and the large quantity of mucoso-pulent matter voided with the urine, alarmed the patient, and serv-

ed to open his eyes to the necessity of having recourse seriously to professional advice, and of submitting to an appropriate treatment. Antiphlogistics, proportioned to the strength of the pulse and to the state of the system, were employed with a view to diminish, or if possible, to subdue entirely the remnant of inflammatory action existing in the diseased membrane, and to prepare the latter for the operation of what have been denominated the stimulants of the urinary organs; and further, for the purpose of removing a gastro-intestinal derangement under which the patient now laboured. These objects being at length attained, and several remedies having been tried ineffectually to arrest the secretory irritation of the bladder, the balsam of copaiba was prescribed in moderate doses. Aided by a few others, which were from time to time employed in order to remove the symptoms of irritation supervening in the digestive and other organs, and subsequently by moderate exercise and mild bitters, this remedy succeeded to the fullest extent of our wishes. Under its use the pain gradually diminished, and, together with the difficulty and frequent desire to void the urine, finally disappeared entirely. The secretion of mucoso-purulent matter became less and less copious, and at length ceased completely; the matter discharged assumed gradually a lighter colour and thinner consistence; and the patient after submitting to treatment during several months—the use of the copaiba being in the course of that period discontinued and resumed several times, to avoid its irritating effects—had the satisfaction of finding himself completely relieved of the painful and dangerous disease I have described.

After enjoying good health during about eight years, this gentleman experienced another attack of the same complaint, under which he finally sank. But in respect to the nature of the attack, to the real condition of the coats of the bladder, or of the prostate gland, and to the remedies employed, I know nothing, as the case came under the care of another physician, from whom I have not been able to obtain any information.

Case II.—The next case I shall mention is that of a gentleman, aged about sixty-five years, and who, after residing during a considerable portion of his life in Philadelphia, removed to the state of Ohio. On my way to the south, in 1825, I made a short stay in the place of his residence, and soon after my arrival was requested to visit him. I was informed that he had suffered to a greater or less extent from disease of the bladder during more than two years. He was much emaciated, and was stretched on a settee, from which he could with difficulty move, on account of debility. The pain in the blad-

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der was very severe, and much aggravated by walking. The desire to void water was frequent, and the discharge was attended with some difficulty. Together with the urine, the patient voided a large quantity of mucoso-purulent matter. The digestive functions were impaired, the appetite was much diminished, the bowels were constipated, the skin was dry and warm, and the pulse accelerated.

I was at the same time informed by the patient that much difference of opinion had existed among the physicians, who, at various periods, had attended him, in relation to the nature of his disease, and to the treatment required for its cure. That some had attributed his sufferings to a disease of the prostate gland, and had treated him accordingly; that by others the symptoms were all referred to the existence of strictures in the urethra, which were endeavoured to be removed by bougies, caustic, &c.; that besides external and mechanical means, a variety of internal remedies had been resorted to, and that among these the balsam of copaiba had been tried. But none of these methods of treatment or remedies seemed to have been serviceable; for the patient declared that so far from having improved during the time, his complaint had increased and continued to do so every day.

At the period of my visit he was no longer under the care of a physician, and had discontinued the use of internal remedies; limiting himself to the occasional introduction of a catheter to facilitate the discharge of urine, and to the frequent use of the tepid bath to sooth the irritation and pain of the bladder. My first impression was that the disease depended chiefly upon an obstruction at the neck of the bladder, arising from strictures or from an enlargement of the prostate gland. This view of the pathology of the case I was led to adopt, not only from a survey of the symptoms, but from being informed that the patient had, at an early period of life, experienced several attacks of gonorrhœa,—the usual excitant of the above-mentioned complaints, and that, about ten years before, he was seized, while at sea, with inflammation of the neck of the bladder, attended with pain, fever, retention of urine, &c. In order to ascertain the fact in a more positive manner I passed a bougie, and then a catheter, along the urethra, but did not experience as much difficulty in penetrating into the bladder as had been anticipated. By a different examination, the prostate was found a little larger than in the natural state, though not sufficiently so to produce an obstruction in the passage; nor did it appear to be otherwise diseased. To this it may be added, that the difficulty experienced in making water and the pain attending this operation, were generally greatly relieved on the passage of a portion

of the tenacious matter above-mentioned, which seemed to act as a plug at the neck of the bladder, and to occasion the greater part of the difficulty. These results very naturally led me to doubt the correctness of the views already stated, and to conclude that the affections of the urethra and prostate gland, though sufficiently marked to deserve attention, were not of a character to account for the symptoms, and that the principal complaint was seated in the bladder itself.

The treatment recommended was based on the above-mentioned view of the seat and nature of the case. It consisted chiefly of those means which appeared calculated to remove the chronic inflammation of the bladder, to diminish the secretion of the mucoso-purulent matter, and restore the digestive organs to their healthy condition. Leeches were accordingly directed to be several times applied to the perinæum and hypogastric region, and, in the event of their not being procured, cupping to the sacrum was recommended as a substitute. The tepid bath was ordered once or twice a day; emollient injections and drinks; the occasional use of castor oil, or of any other mild purgative, to obviate the effects of constipated bowels; opiates, to procure sleep, and light nourishment, were likewise enjoined. Finally, directions were left with the patient to commence the use of the balsam of copaiba in small and repeated doses, in a mild bitter, as soon as the irritation of the bladder should be somewhat reduced by the above-mentioned means, and the state of the gastro-intestinal organs would permit.

The next day I left the place for the south, and on my return, six weeks after, was informed by a friend who visited me on board of the steamer, that the gentleman whose disease has just been described was probably better, inasmuch as he was now able to walk about the town. On reaching this city I sought further information from the patient's friends and learned that he had repeatedly stated in his letters, that the *remedy* prescribed by me had had the desired effect—that he was comparatively well, and experienced little or no inconvenience from his painful disease.

This gentleman suffered some time after a severe relapse, and had recourse to the same means, and with an equally happy result. After enjoying a tolerable share of health during two or three years, he again became a sufferer from disease of the bladder; the obstruction in the urethra increased gradually and at length became almost unconquerable, except by mechanical means; the pain became more and more severe; the discharge of mucus from the bladder increased, was attended with pain, and effected with considerable difficulty. In this condition he removed to Philadelphia, and in the spring

of 1829, once more placed himself under my care. The usual remedies for complaints of that kind were resorted to under the direction of two of the ablest surgeons of the city and myself; but were not productive of the least amelioration. The patient wasted away, and after suffering unexampled agony during several months, sank into the grave. On examination after death, an ill-conditioned ulcer of the bladder, (in the centre of which was found a small calculus,) was discovered. The prostrate gland was slightly enlarged.

Case III.—In June, 1831, I was requested to visit Mr. R. of this city, aged about fifty years. He informed me that he had for some time past suffered considerably from pain in the bladder, particularly when he endeavoured to retain his urine; that the desire to void that fluid was very frequent, and that it usually contained a large quantity of thick whitish matter, which was discharged in flakes—principally after the urine itself had been passed, and settled at the bottom of the recipient. The disease had come on gradually, and was at first attended with so little pain and inconvenience that it hardly attracted the attention of the patient, and caused no uneasiness. From this circumstance it was allowed to run on a considerable while before recourse was had to professional advice. Mr. R. had laboured under a gonorrhœal attack, which subsided a week or two prior to the accession of the symptoms above-mentioned. At the period of my visit, the symptoms had become rapidly aggravated, and the patient was so much indisposed as to be obliged to keep his bed. He complained, independently of the affection of the bladder, of gastro-intestinal derangement, loss of appetite, thirst, slight nausea, constipated bowels, furred tongue, and pain in the head; and had, besides, a hot skin and a febrile pulse.

Having ascertained by means of a catheter, and by the introduction of the finger up the rectum, that there existed neither stricture in the urethra nor enlargement of the prostate, it appeared that the indication was simply to remove the irritation of the mucous coat of the bladder, and to correct the morbid state of the gastric organs, on both of which diseases the febrile excitement probably depended. Leeches were freely applied to the perineum and above the pubes—emollient injections into the bowels and bladder were ordered, and the patient was subjected to the routine of remedies, drinks, &c. usually prescibed under circumstances of the kind. But although adhered to with scrupulous care, this plan of treatment was not as rapidly beneficial as had been anticipated, and some time elapsed before decided relief was obtained. As soon as the symptoms of acute irritation of the bladder had given way, and the mor-

bid condition of the gastro-intestinal organs and the excited state of the arterial system had been amended, astringents, tonics and chalybeates, were successively resorted to, with a view to put a stop to the increased and deranged secretion of the bladder. But none of these remedies, or the terebinthinates, were of much avail. Indeed, under the use of some of them, the inflammatory symptoms seemed disposed to return, and it was found necessary not only to discontinue the use of them, but to have recourse occasionally, to emollient and even to moderate antiphlogistic means.

The balsam of copaiba was the next remedy tried; but it at first disagreed with the stomach; laudanum was added, and various vehicles, (among which weak claret and water were found to answer best,) were tried. At length, however, the medicine was made to sit well on the stomach, and although administered in small doses, and discontinued occasionally for a day or two at a time, in order to guard against gastric irritation, it produced in about two weeks the most decided benefit. The irritation of the bladder decreased in a gradual but steady manner—the desire to make water became less frequent, the discharge of mucus diminished and after a while ceased entirely; and the patient was at length completely relieved of the distressing and painful symptoms under which he had so long laboured.

It is deserving of mention in this place, that during the course of the treatment, the gonorrhœal discharge made its appearance, and continued some days, without, however, occasioning any relief to the affection of the bladder. It is now nearly three years since this cure was effected, and the patient has continued free from all uneasiness about the urinary organs, and in the enjoyment of perfect health.

It must appear evident to all who peruse these pages, that the balsam of copaiba was signally useful in the above cases, and constituted, in fact, the principal means of bringing about the favourable results I have recorded. Cystitis being always, though more particularly when it assumes the chronic form, and attacks persons of advanced age, a protracted and dangerous disease, it is hardly possible to deny, that the individuals who were the subjects of those cases, were fortunate in being so speedily—I speak comparatively—relieved. If this be admitted, we must allow, also, that the remedy which acted so conspicuous a part in their cure, is entitled to more commendation than is now usually bestowed upon it, and should be regarded as a highly useful article in the treatment of the disease in question. In all the above cases,

the benefit obtained from the copaiba was, as must have been perceived, not long in manifesting itself; for the first patient was enabled very soon after commencing the use of that remedy to walk out for exercise; the second had so far recovered in the space of five weeks as to be able to leave his room, to which he had long been confined, and to walk about the town; while in the third case, relief was obtained in a much shorter time than in either of the preceding.

It is not impossible that by some it may be objected, that those individuals might have been cured without the aid of the copaiba; and that there is no proof of the cure being attributable to that remedy rather than to the other means employed. In reply, it may be remarked, that no doubt can be entertained of many cures of chronic catarrh of the bladder being effected without the aid of the copaiba. To maintain the contrary would be equivalent to representing that remedy as the only one capable of being of service in that complaint, which would be not only inaccurate, but absurd. It is moreover highly possible—I will not say certain—that in the very cases in question, success might have been obtained without it. But neither of these circumstances appear calculated to detract from the praise bestowed upon the copaiba, since we have yet to discover the article of the materia medica so indispensably requisite for the treatment of any disease as not to be dispensed with, with perfect safety and with a fair chance of success, in many cases. Nor is it less true, that when we succeed with one remedy in the treatment of a disease, it is not always easy to prove in a conclusive manner that it is entitled to the honours of the cure. Nevertheless, although there may sometimes exist room for cavil and disputation on that subject, we are enabled, by comparing the effects of a remedy in a variety of cases of the same complaint, with those of other articles, and by observing the modifications which take place in the symptoms after their exhibition, to arrive at a tolerably accurate conclusion respecting the degree of the agency of each in occasioning those modifications. Hence, when an individual who has laboured during some time under a disease, makes use of a particular remedy, and when shortly after commencing it, the symptoms begin to yield and gradually disappear, we may safely conclude, particularly if similar results have been noticed after the exhibition of the remedy in other cases of the same complaint, that the benefit obtained is due to that remedy. The correctness of this conclusion is rendered still more apparent if the disease belongs to that class, which, when left to the recuperative powers of the system, are seldom if ever cured, and if it has been ineffectually combated by other means

prior to the employment of the successful one. Now it need hardly be remarked, that this is precisely what took place in regard to the copaiba in the cases above described; for the catarrh of the bladder is seldom if ever cured without the aid of art; in each instance the patient had suffered considerably before the remedy was employed; and in all, the relief obtained followed very closely its exhibition. With these facts before us it would be scarcely reasonable to entertain any doubt respecting the beneficial agency of the copaiba in the cases detailed. As the other means employed, at the same time or shortly before, consisted, except in one case, of antiphlogistics and emollients, which, so far as my information extends, have never alone cured a case of suppurative or secretory irritation of the bladder, it is not presumable that any other effect can be attributed to them than that of having moderated the irritation of the organs primarily and secondarily affected, and prevented it from transcending the degree compatible with the advantageous administration of the copaiba.

Some difference of opinion prevails among practitioners in respect to the quantity in which the balsam of copaiba should be administered to insure it success in the disease which forms the subject of these remarks. Messrs. Delpech, Ribes, and others, prescribe it in very large, while other physicians prefer using it in small and repeated doses. So far as I am able to pronounce from the facts I have had occasion to observe, I am disposed to think that the copaiba answers as beneficial a purpose in the catarrh of the bladder, when administered in the latter, as in the former dose; and that when thus given, either in cold water, in milk, or mucilage, or in a slightly aromatic infusion, according to the condition of the diseased parts or of the system at large, there is much less risk of distressing and irritating the gastro-intestinal organs. Another advantage accruing from that method is, that the physician is thereby enabled to persevere in the use of the copaiba during a much longer period than when he administers it in drachm and table-spoonful doses; as in the latter case it is more apt to pass off by the bowels—it is less effectually absorbed—the system becomes less certainly, as it were, impregnated with it, and less time is afforded for obtaining the desired effect on the diseased membrane.

It is, I hope, almost a work of supererogation to remark, that in advocating the use of the copaiba in chronic cystitis, it is far from my wish to recommend it as an infallible remedy. So far from this, I am ready to admit that cases occur in which, although the state of the gastro-intestinal canal,—the degree of irritation in the

bladder, and the condition of the arterial system may seem to indicate the probability of success, this remedy fails completely. In other instances the advantages resulting from its use are of a very restricted nature; and in a third set of cases, the symptoms of irritation are aggravated soon after the remedy begins to pass off with the urine, although it would have been natural to anticipate a very different result. But these cases, particularly the last, will, I feel confident, prove of rarer occurrence than is imagined. Even were they more frequent than we know them to be, it would be impossible to argue from that circumstance the impropriety of resorting to the copaiba, because the proofs of its efficacy in many cases are placed beyond the reach of doubt; and on trial it will be found that its failures are not more numerous than those of other remedies which are in daily use in the hands of many physicians. Indeed it is impossible to point out any article of the materia medica which succeeds invariably, and is not apt to fail or sometimes to act injuriously under particular circumstances. If therefore, we abandon the use of the copaiba on the strength of its sometimes failing, or of its producing undue irritation, there is no reason why we should continue to employ other articles just as uncertain as it in their effects. Impressed with the correctness of this circumstance, and relying on what I have had occasion to observe myself, as well as on the favourable testimony borne as regards its effects in the various publications cited above, I feel no hesitation in affirming, that whatever may be its want of success in some cases, the copaiba deserves a trial in the disease before us; that in a few weeks, sometimes in a shorter period,—provided the cases be well selected, the symptoms of acute inflammation properly subdued, and the stomach be free from irritation, the pain in the bladder will begin to subside, the flow of urine will become freer, and the desire to void it less frequent, and the quantity of matter will decrease in a very sensible manner. In some instances the copaiba, after producing a marked amelioration of the most urgent symptoms, loses its effect. It often becomes necessary under such circumstances to discontinue it entirely and to resort to other remedies; but in some instances it will be sufficient to suspend its employment during a few days. Indeed from some facts which have presented themselves to my observation, I am inclined to believe that whenever we resort to the copaiba in affections of the mucous lining of the bladder, it is more advantageous to continue it only during a limited period—from a few days to one or two weeks; and to resume its use after a short interval. This plan I have pursued even

in cases in which there was no evidence of diminished virtue in the remedy; the object being to prevent the membrane from becoming habituated to its action, or unduly irritated by it, and also to guard against the inflammation or derangement of the stomach, which it is sometimes apt to occasion.

That those who resort to the copaiba in catarrhal affections of the bladder may not be precipitate in abandoning it, when it does not prove promptly effective, we may observe that cases present themselves in which this remedy is very slow in its effects, and that in one or two instances in the practice of a friend, in which the remedy was ultimately successful, several weeks elapsed before any decided amendment was obtained. Had it been discontinued at an early period, it might have been accused of failure; but the issue showed how erroneous such a conclusion would have been, and proved the necessity of giving the remedy a fair trial in all cases. It is not unlikely that some physicians may exclaim that a remedy which is sometimes so tardy in its operation, does not deserve the attention here bestowed upon it, and should make way for others of a more prompt efficacy. This objection, however, need not occupy our attention very seriously, because the cases in which the curative effects of the copaiba are slow in being obtained will be found of comparatively rare occurrence, and because it is doubtful whether the other remedies recommended in the same complaint would really act more expeditiously. The disease has always, and with reason too, been regarded as one of a very formidable character, and little under the controul of the most rational plans of treatment and of the most approved remedies, and there is not one of these with which I am acquainted that is not occasionally as slow in its operation as the copaiba is found to be in some instances.

The above cases and remarks will, it is hoped, tend to show that the balsam of copaiba may, under particular circumstances, be advantageously used in the treatment of catarrhal inflammation of the bladder; that it is not necessary to prescribe it in very large doses; that it may be useful when the diseased parts are yet in a state of well-marked irritation; and that it is not simply useful by putting a stop, by its astringent qualities, to the copious discharge of matter resulting from a relaxed state of the mucous membrane. At the same time, they show that the copaiba is not an infallible remedy; that in some cases it fails completely; that in others it is very slow in producing its remedial effects; that in a few instances it may even be injurious; but that if due care be taken in the selection of the proper cases, and if the diseased parts be well prepared for its administra-

tion, and the gastric organs in a proper condition, it will seldom give rise to those effects, and will act both safely and expeditiously.

Irritability of the Bladder.—From what has been stated in the course of the preceding remarks, it may perhaps be inferred, that in the opinion of the writer, the use of the copaiba should be restricted to those cases of diseases of the bladder, in which the mucous membrane is affected with a secretory or suppurative inflammation. Such, indeed, was long the sentiment he entertained on the subject, and to which he was led by the silence of writers in relation to the efficacy of that remedy in cases of a different character; by a consideration of its known astringent and stimulant properties, and by the want of opportunities to test its virtue in other than secretory inflammations. Subsequent experience, has, however, taught him the propriety of changing his former views, for in a few cases presenting evident symptoms of chronic irritation of the mucous membrane of the bladder, but unaccompanied by increased morbid secretion, he has prescribed the copaiba with the most decided success. These results prove, in a most conclusive manner, that the copaiba does not act, in affections of the mucous membranes, simply by arresting a profuse secretion, the effect of an atonic state, but that it operates, in certain diseases of those parts, either by virtue of a specific action, or by revulsion. But whatever be the conclusion to which we may arrive from these facts, respecting the mode of operation of the copaiba, they show that the remedy may be used in a set of cases in which, so far as my information extends, it has not often been employed. Nevertheless, while expressing these sentiments, it is far from my intention to suggest the propriety of resorting to the remedy in question in all cases of chronic irritation of the bladder. My opportunities of using it in that disease have been too limited to justify so indiscriminate a recommendation; and while I am inclined to think, from the trials I have made, that the copaiba will prove serviceable in some instances, I can easily comprehend that it should not be used without great caution.

The following case will, it is believed, justify the praise thus bestowed upon it.

Case.—Mr. G. aged about forty-five years, and of a nervoso-sanguine temperament, applied to me for professional advice, in the autumn of 1826. He informed me that he had, for a long while prior to the onset of his present malady, enjoyed excellent health,—that, without being able to assign any cause, he had in a very gradual manner become affected with irritability of the bladder; and that this com-

plaint, which proved the source of much inconvenience and considerable uneasiness to him, was characterized by very frequent desire to make water, and by pain whenever he endeavoured to retain it. As Mr. G. was, by the duties of his profession,—that of a teacher of music, under the necessity of remaining, often during an hour or two at a time, in attendance on ladies, and could not in consequence absent himself as frequently and as promptly as might be required to satisfy the calls to make water, he was at times placed in a very embarrassing predicament, and on several occasions was unable to get off with sufficient celerity to escape an unpleasant accident. Owing to these circumstances, and to the frequency of his disturbances at night, he expressed the greatest desire to place himself at once under medical treatment, and regretted his having lost much time in trying a variety of remedies recommended to him by officious friends. He informed me that he had experienced, a few years before, several attacks of gonorrhœa, which, however, appeared to have been entirely cured. He further stated that his genital organs were easily excited, that he was much prone to certain desires, and that he was not backward in gratifying them. With the exception of the vesical irritation above-mentioned, and which was unaccompanied by a discharge of mucus, or by a gravelly deposit in the urine, Mr. G. was free from any disease of importance. He complained only of slight gastric derangement, and on examination the temperature of the surface and the pulse were discovered not to exceed the standard of health.

It appeared evident, from a survey of the symptoms under which Mr. G. laboured, that his disease could not depend merely on the irritating quality of the urine,—a cause assigned by some writers to cases of the kind, because the disease had already lasted some time, and had continued uninfluenced by any of the articles of food or drink made use of, and because the fluid was in general pale, and always limpid. Nor did it seem at all likely, from this condition of the urine, as well as from the absence of pain in the bladder after voiding it, that the complaint depended on gravel or stone. Finally, the power of retaining the fluid, though at the expense of a little suffering, indicated that the symptoms could not be the result of an atonic or debilitated state of the muscular coat, or of the sphincters of the bladder. The only view of the case, then, that appeared to be well founded, was that the disease—for so the complaint under which Mr. G. laboured, and which almost amounted to incontinence of urine, deserved to be called—arose from an irritation of the lining membrane of the bladder, which irritation was aggravated by the presence of the urine, and acting secondarily on the muscular coat elicited its con-

traction in order to effect the expulsion of the offending cause. Under the influence of this opinion, recourse was had to such means as might prove serviceable in removing and in guarding against the occurrence of circumstances capable of keeping up the morbid state in question. The patient was advised to abstain from sexual intercourse, and from all circumstances capable of arousing the excitability of the genital organs. Remedies calculated to restore the functions of the gastro-intestinal canal to the healthy point were prescribed, and to these were added, for the purpose of removing the affection of the bladder, moderate antiphlogistic, demulcent, narcotic, and antispasmodic means, both general and local. These remedies were persevered in during a considerable time, but proved of no avail. Recourse was next had to uva ursi, to the tincture of cantharides, to nux vomica, to muriated tincture of iron, &c. under the impression that the disease, after all, might depend on a different cause from that which had at first been assigned. But, instead of having the desired effect, these remedies appeared to aggravate the disease, and my patience, as well as that of Mr. G. was becoming exhausted, when it occurred to me that the balsam of copaiba might perhaps be employed beneficially. To this I was led, not by the result of any previous personal experience with this article in cases of the kind, or by having seen it recommended by other practitioners, but by the recollection of the decided benefit obtained from it in chronic secretory irritation of the mucous membranes generally, and by reflecting that as the remedy probably produces its effects through means of a peculiar action exercised on that tissue, and not merely through its astringent properties, it might display a beneficial effect in the case before me, although the irritation was not accompanied by increased or morbid secretion. In conformity with this view, the copaiba was prescribed in doses of thirty drops, three times a day, and, to the no small satisfaction of the patient, the disease began, in a very short time, to give way. The calls to make water became gradually less frequent, the pain diminished, Mr. G. was soon enabled to retain his urine much longer than he had done for a considerable period before, and in the course of a few weeks he was completely freed from his troublesome and painful complaint. He continued the use of the copaiba, as a precautionary measure, during several weeks longer, and left it off gradually.

Another case similar to the one just described has since fallen under my observation. The copaiba was used in the same manner, and proved equally, and indeed more rapidly, successful. But as the details would occupy more space than can be spared, and

prove of little interest to the reader, I shall abstain from presenting them.

Since writing these pages, my friend, Dr. Hays, to whom I communicated the above facts, has tried the copaiba in a case of irritability of the bladder, which had resisted the usual remedies, and obtained from it results as satisfactory as those I have recorded.

The balsam of copaiba has been used in other diseases of the urinary organs. Boerhaave, (Aph. 1001,) recommends for the cure of abscess of the kidneys, after the urine becomes purulent, simple diuretics in soft and nitrous spa waters, together with the whey of new milk, *balsams*, and the like; and Van Swieten, in commenting on this Aphorism, speaks in terms of commendation of the above practice, and remarks, in relation to the balsams, under which name he includes only the natural ones, the Peruvian, the copaiba, &c. that they have their merits in such ulcerations of the kidneys, if they are given in small doses, three or four times a day, with plenty of diluents drinks. Otherwise, he adds, they are over-heating, and will often cause strangury and inflammation of the urinary passages. At a much more recent period, Nysten* stated that the balsam of copaiba is occasionally found useful in cases of nephritic calculi, and we learn from Mr. Brande† that he has seen it of service in allaying the irritation and diminishing the secretion of red or uric sand. Mr. Hooper, in his account of the sick landed from Corunna,‡ states that he employed the copaiba with immediate relief to those patients who complained of a suppression of urine; the disease under which they laboured being the dysentery. The medicine appeared to be of service in relieving the tenesmus, "and a small quantity of urine was evacuated soon after the administration of the second dose." It is likely that in all those cases the copaiba was serviceable partly from its effects as a diuretic; but in those instances in which Mr. Hooper found it useful, the benefit may in some measure be ascribed to the soothing effects of the remedy on the irritated mucous membrane of the intestines, the inflammation and pain of which probably served to keep the urinary organs in a state of vital orgasm, and thereby prevent the secretion or the discharge of the urine from taking place.

In a communication read before the Philadelphia College of Physicians a few years ago, and which was published in the North American Medical and Surgical Journal, vol. 6, Dr. John Ruan, of this city, related several cases of a distressing disease, the pruritus vulvæ.

* Dict. des Sciences Méd. art. *Copahu.* † Manual of Pharmacy, p. 17.
‡ Edinburgh Medical and Surgical Journal, vol. 5, p. 400.

In the first case many remedies were employed. Some of these procured some mitigation to the patient's sufferings, but nothing like a cure was effected until the balsam of copaiba was used. This, in doses of twenty drops, three times a day, acted like a charm. In a second case, a variety of remedies were ineffectually used. The copaiba was at length resorted to, and proved speedily successful. Dr. Ruan tried the same remedy in two other cases, but it failed. When, however, we bear in mind the distressing character of the pruritus vulvæ, and its unmanageableness with the remedies ordinarily employed for its cure, we cannot help being gratified at the results obtained by Dr. Ruan with the copaiba. Two cases out of four do not constitute a trifling proportion, and the success must necessarily encourage us to make further trials with that remedy. I have myself had no experience with it in this disease, or in any of those mentioned above, and have only alluded to the subject for the purpose of completing the survey of the principal affections of the urinary organs in which the copaiba has been found serviceable.

Leucorrhœa.—The introduction of the balsam of copaiba in the treatment of leucorrhœa may be traced to a very remote period in the history of that article, for on consulting the various writers who, in the preceding and present centuries, have entered more or less in detail on its medicinal virtues generally, or spoken of it in reference to its effects in particular complaints, it will be found that it is often represented as a useful remedy in that disease. Ettmuller, and some other of the older physicians, recommended terebinthinate and balsamic medicines in the treatment of leucorrhœa, and although they do not make special mention of the copaiba, we may presume that they allude to it no less than to the other remedies of the same class. We find also that so early as the year 1710, Hoppe, in a dissertation on the medicinal virtues of the article,* speaks of its use in that disease in a manner calculated to show that in his times it constituted a favourite remedy. Lewis† enumerates leucorrhœa among the diseases in which the copaiba is principally used, and in which it is *found preferable to the other balsams.* Motherby‡ and Lieutaud§ also mention it as a valuable remedy in the same complaint. If we pass to writers of a more recent period, we shall find, that although the remark of Dr. Cullen, who for a time was considered as high

* See Cullen's Materia Medica, vol. 2, p. 134, Barton's edition.
† Materia Medica, 4to. p. 132. ‡ Medical Dict. p. 200.
§ Matière Médicale, 1. 321.

authority in practical medicine, that it is not often prescribed with success, "owing to the stomach not being able to bear a sufficient quantity of it,"* deterred many from resorting to it, yet the number of its advocates has been, since the time of that illustrious professor, nearly as great as it was formerly. It is mentioned with more or less commendation by DEJAEN,† CATTET and LACOMBE,‡ BARBIER,§ ARMSTRONG,‖ FABRE,¶ LARREY, of Toulouse,** GOOD,†† MONTEGRE,‡‡ RICHARD,§§ NYSTEN,‖‖ LOCOCK,¶¶ MERAT and DELENS,*** and by some of these writers it has been frequently used with the happiest results, and recommended as an invaluable medicine in particular stages of the disease in question.

But although the copaiba has long been used and continues to be enumerated among the most useful remedies in the treatment of leucorrhœa, some difference of opinion prevails in relation to the form and stage of the disease to which it is more particularly appropriate. Some practitioners, for example, have resorted to it, and seem disposed to advocate its employment, at an early period; even when there still exists considerable activity in the capillary circulation of the diseased part, as manifested by pain, heat, and the dark colour and viscid nature of the matter discharged. Others, on the contrary, maintain that it should be carefully abstained from under such circumtances, and that it is only useful or safe in recent and simple cases, when there exists from the commencement an atonic state of the parts, or else in the last stages of the inflammatory form, when the increased action in the affected membrane has been completely subdued by antiphlogistics; in a word, when the complaint has passed to the chronic state, and the discharge is kept up by a sort of vitiated habit.

It need hardly be remarked that in this country, where the copaiba is more generally and extensively employed in the treatment of urethral discharges than any where else, the number of physicians who resort to it to combat leucorrhœa—between which and the complaints just named there has generally been supposed to exist considerable

* Materia Medica, 1. 134. † Dict. des Sciences Médicale, 6. art. *Copahu.*
‡ Bibliothèque Méd. 35. p. 202. § Matière Médicale, 2. p. 120.
‖ Practical Illustr. of the Scarlet Fever, &c. p 359.
¶ De la Sophistication des Subst. Médicinales, p. 18.
** Annales Cliniques de Montpellier, 26. p. 292.
†† Study of Medicine, 5. p. 71, (American edition.)
‡‡ Traité des Hemorrhoides, p. 351. §§ Elémens d'Hist. Nat. 2. p. 507.
‖‖ Dict. des Sciences Méd. 6. ¶¶ Cyclopedia of Pract. Med. 3.
*** Dict. de Matière Méd. 2. p. 418.

analogy, is comparatively small. Such being the case, it is not likely we shall discover many among them capable of furnishing from the result of their own experience such information as may enable us to arrive at a decision in respect to the points above-mentioned, and from whose writings any knowledge of a valuable character relative to the use of copaiba in leucorrhœa can be obtained. Influenced, however, by a consideration of the effects obtained from that remedy, not only in gonorrhœal discharges, but in the secretory irritation of the mucous membranes generally, as well as by the opinions expressed and the facts detailed by the writers whose names are recorded above; little satisfied, besides, with the effects produced in some cases by the articles usually resorted to in the treatment of fluor albus, I ventured, notwithstanding the silence of our writers on the subject, to make use of the copaiba in two cases which had resisted the usual plans and the most vaunted remedies. The results were such as to encourage me to make further trials with it myself, and to urge the propriety of doing the same on some of my medical friends. This was accordingly done, and on comparing my own notes and those furnished to me on the cases treated by the copaiba, and on reflecting carefully on the effects obtained, I have no hesitation in recommending it as a useful remedy in the treatment of leucorrhœa, and in expressing the opinion that it is more efficient than some others much more loudly extolled by writers in Europe and this country; that when used in suitable cases, and with proper precautions, it will be found to be a perfectly safe article; and that it possesses an advantage over certain remedies, in greater vogue, of never or very seldom giving rise to strangury and other painful accidents, which render those articles so objectionable to all patients, and to unprejudiced practitioners.

In saying thus much of the efficacy of the copaiba in leucorrhœa, it is not my wish to represent it as capable of being successfully employed in all cases and under all circumstances, or as being superior to all the other remedies usually prescribed in that disease. Cases have presented themselves in which it has been productive of little benefit, or has even failed completely. To claim for it a power over all cases, and beneficial effects in every stage of the disease, would be not only to present an exaggerated estimate of its real efficacy, but also to betray an unpardonable ignorance respecting the diversity of circumstances connected with the production of leucorrhœal discharges, the degree of safety attending their suppression, and the variety of morbid conditions on which they may depend; as well as respecting the known properties of the remedy, and the difference of effects produced under different, and even under analogous circum-

stances in the same complaint, by the same medicinal agents. Every one knows that leucorrhœa is often a symptomatic complaint, the state of the general habit being the cause of it, the *fons et origo mali.* In such cases, the suppression or diminution of the discharge by the copaiba or other means, may doubtless be desirable and advantageous; because independently of the fact, that it is loathsome to the patient, this discharge tends in its turn to keep up that deranged state of the constitution on which it depends. But in all such cases this suppression can only be of secondary importance; the constitutional derangement claiming, of course, the principal share of attention. In another set of cases leucorrhœa depends on, and is symptomatic of an affection of the uterus or of some other organ; and before the discharge can be removed, the disease giving rise to it must be eradicated. Here again the copaiba and other anti-leucorrhœal remedies can only be of secondary advantage; and very many cases will occur in which it cannot be used at all, or will prove far inferior to other means. In a third series the organs which receive the first impression of the copaiba are so implicated as to require our prohibiting altogether the use of the remedy; although the disease itself, might, under different circumstances have been benefited by it. In a fourth set the discharge has assumed the character of an habitual drain, which it would be dangerous to suppress, unless we establish a substitute in some other part of the body, and which, indeed, it is often found impossible to put a stop to by any of the remedies in our possession.

But after making a deduction of the cases of the above description, in all of which, by the way, cantharides and other remedies so pompously recommended would prove just as objectionable as the copaiba, there will remain a number of others, depending on causes of a very different kind, and connected with a different condition of the system at large, or of the gastro-intestinal organs in particular; in a word, which are local in their character; free from complications contraïndicating the use of active anti-leucorrhœal remedies, and which it may be possible and desirable to cure. It is in such cases that the balsam of copaiba will, unless I am greatly mistaken, prove often useful. If other means are sometimes found to succeed in cases in which the copaiba has failed, the circumstances must be attributed to a particular idiosyncrasy in the patient, to a peculiar degree and kind of irritability of the gastric mucous membrane, either natural or acquired, by which it is rendered incapable of bearing the contact of that remedy, or to other causes, needless for me to enumerate. But be the cause what it may, it is not possible to discover in those failures a reason for refusing to employ

the copaiba, inasmuch as on trial it will be found that the cases in which it proves inefficacious are of rare occurrence; and because, as every physician must know, a similar objection might, with equal justice, be urged against every article of the materia medica.

The nature of the action exercised by the copaiba on the living tissues, and its mode of operation in disease would seem to indicate, à priori, the necessity of deferring the employment of that remedy, in leucorrhœa, until the imflammatory symptoms—heat, pain, febrile excitement, and dark colour of the matter discharged,—had been, to a certain degree, subdued by antiphlogistics and emollients. Now, experience will, I feel confident, be found fully to justify the supposition; and no one who has used the copaiba to some extent in the disease in question, and marked its effects, will refuse to join in the sentiment that the practitioner, whenever he wishes to derive benefit from it, must carefully conform to the plan suggested. On this point it is necessary to be very explicit; because there are some physicians who, while admitting the inflammatory nature of leucorrhœa, disregard the necessity of depletion; and who, viewing the copaiba in the light of a specific, might feel disposed to use it in all the stages of the disease. Again, on the other hand, there are not wanting works, of some authority too, in which leucorrhœa is represented as being, in every case, and under all circumstances,—whatever symptoms present themselves, a disease of debility, depending on a relaxed or atonic state of the parts and of the system at large, and calling from the commencement, for the use of tonics and stimulants, among which are properly placed the balsamics. It need hardly be remarked to those who entertain different views of the nature of the disease, as well as of the remedies required for its cure, and of their mode of operation, that the opinions alluded to are calculated to lead to an erroneous and dangerous practice. They will immediately perceive the propriety of insisting on the necessity of pursuing the course I have recommended,—of resorting to antiphlogistics in the early stages, whenever the inflammatory symptoms run high, and abstaining from copaiba until these have been greatly moderated—and thereby preventing, if possible, others from adopting the mode of practice advocated by the physicians and in the works adverted to. It is necessary to add, that, in order that the copaiba may be used with effect and safety, in leucorrhœa and other complaints of the mucous membranes, all symptoms of gastric inflammation or irritation should have subsided.

But while thus dwelling on the necessity of subduing, by proper remedies, symptoms of undue irritation previously to administering

the copaiba, I am far from admitting the propriety of limiting its use, as LAGNEAU, PINEL, BRICHETEAU have recommended, to those cases in which there really exists an atony of the diseased organs, and to the very last stage of the complaint, when nothing seems requisite to be done but to give tone to the parts and to arrest the discharge. This would be going to another extreme, which may with propriety be regarded just as unfounded as the one already noticed. So far, indeed, from pointing out the necessity of restricting so greatly the use of the copaiba, experience teaches that it may be usefully employed in cases in which, though the inflammation has been considerably moderated by antiphlogistics and soothing applications, the parts are not only in a state different from atony, but present phenomena characteristic of a notable degree of irritation. That such is the state of the diseased tissue in many cases in which the copaiba is usefully employed, we have a proof in the circumstance, that with few exceptions, other stimulants are generally not only useless but detrimental.

But enough has already been said on this subject, and after remarking, that the fact of copaiba being useful under the circumstances mentioned, shows that the object to be obtained is not simply to astringe and strengthen an atonic tissue, but to produce an action capable of modifying and thereby removing the morbid one on which the disease depends, I proceed to present the details of a few cases which, it is believed, will serve to confirm the views I have thus advocated.

CASE I.—A married coloured women, about thirty years of age, and of a lymphatic temperament, consulted me a few years ago for well-marked leucorrhœa. The disease was of two months standing, and proved a source of great inconvenience to her on account of the profuseness of the vaginal discharge, of the sensation of heat, and of the pain she experienced in the parts, particularly during coition. The matter was thick and of a dark colour; the skin was rather warmer and drier than in the natural state; the pulse quick and tense; and the tongue red on the edges, and furred in the centre. There was little or no appetite for food, and the bowels were constipated. On examination per vaginam, the parts were found to be tender, but the uterus exhibited no signs of disease. The patient informed me that she had menstruated at the regular period, two weeks before, but that on that occasion, as well indeed as ever since the appearance of the leucorrhœal complaint, the quantity of blood discharged was much smaller than it was in ordinary times. It may be added, that her health was naturally delicate; that she had some years before

laboured under a protracted attack of the same disease; that she had taken a vast quantity of medicine for its cure, and finally, that her habits of life were correct and temperate.

In order to subdue the vaginal irritation and the gastro-intestinal derangement, bleeding from the arm, emollient drinks and lavements, vaginal injections of the same nature, tepid baths, low vegetable diet, and complete abstinence from sexual intercourse, were recommended. In less than a week the woman again called to see me. Finding now that the gastro-enteritic irritation had greatly abated, and that the other symptoms were somewhat mitigated, mild purgatives were ordered, and the patient was advised to continue the use of the above-mentioned means—venesection excepted. At the next visit the pulse was found to have lost its tenseness; the tongue presented a more natural appearance; the appetite had improved; the heat and pain in the vagina had lessened, and the matter discharged, though still abundant, had lost to a certain degree its viscidity and dark colour.

Regarding this as a suitable case for the exhibition of the copaiba, twenty-five drops of the medicine were prescribed three times a day in a wine glassful of milk. The patient was desired to continue, if possible, the use of the copaiba during two weeks without intermission, and to call on me at the expiration of that time. This was faithfully complied with, and when next I saw her, she informed me that the remedy did not in the least disagree with her stomach, that since she commenced using it the leucorrhœal discharge had greatly decreased, and that in every respect her health was much improved. The copaiba was ordered to be continued in increased doses, and in a short time the woman called on me, and reported herself perfectly restored and free from her troublesome complaint.

It may be remarked, that in this case no astringent, tonic, or stimulant, no anti-leucorrhœal remedy, except the copaiba, was prescribed, and that the latter was resorted to, although the parts were far from being in a state of atony. From these circumstances, and owing to the fact, that a cure could not have been effected by the means at first prescribed—antiphlogistics and emollients, it must follow, that the entire credit should be awarded to the copaiba, and that those who would limit the use of this remedy to atonic cases, have but a very imperfect idea of its efficacy and mode of operation. The attack just described, though, as appeared from the information communicated by the patient, more formidable than the one under which she had laboured formerly, was cured much more expeditiously; from which we may conclude, that the copaiba is, at least

sometimes superior to other anti-leucorrhœal remedies. Whether this woman has continued free from the disease since that period, I am unable to say, as I have completely lost sight of her.

Case II.—Madame B. aged about forty years, of a nervoso-sanguine temperament, and usually enjoying good health, experienced about the year 1826 domestic troubles, which brought on a state of melancholy. The catamenial functions were deranged, both in respect to the quantity of blood discharged, and to the regularity of the periods. The digestive functions became in a short time implicated, to such a degree indeed, that the gastric derangement assumed at length the characters of well-marked dyspepsia. A short time after the commencement of her disease, Mrs. B. was attacked with acute pain in the region of the bladder attended with frequent desire to make water, and with copious leucorrhœal discharge.

Such was the state of Mrs. B. when I began my attendance. As may readily be presumed, the first remedial measures resorted to were such as appeared best calculated to relieve her from the pain she suffered, and to restore her digestive and urinary organs to their normal condition. Leeches, rest, hip-baths, emollient vaginal injections, fomentations, opiates, a suitable diet, were successively prescribed. By these means the irritation of the bladder was soon relieved, but the dyspeptic symptoms which evidently depended more on gastralgia than gastritis, continued unabated. With a view to remove them, a variety of remedies ordinarily used in such cases were administered, but without success. The prussic acid was now prescribed in small doses, and proved so highly and promptly efficacious, that in a short time the gastric derangement disappeared completely. This desirable object having been attained, an opportunity was afforded for administering such remedies as appeared required to put a stop to the leucorrhœal discharge, which had been little, if at all, influenced by the treatment heretofore pursued, and was accompanied with heat and pain in the vagina.

After continuing the use of emollients a few days longer, I ventured, not without hesitation however, on a few drops of copaiba, and directed that the remedy should be taken in a small quantity of milk, and on a full stomach. But as this organ, though free from positive disease, was preternaturally irritable, some difficulty was at first experienced in causing the copaiba to sit well upon it. Pain, nausea, and occasional vomiting, were the consequence of its use, and necessitated the suspension of it. At length this condition of the stomach being relieved by proper means, another trial of the copaiba was determined upon, which proved more successful than the first,

the remedy agreeing better than it had done before, and producing none of the effects mentioned above, with the exception of a little nausea. The dose was in consequence gradually increased to twenty-five drops three times a day. For fear however of its once more occasioning, if persevered in constantly, undue irritation of the stomach, it was discontinued for one day at a time, twice a week, and the patient was directed to make use, on those days, of emollient drinks, and small doses of prussic acid. By attending to these precautionary measures, Mrs. B. was enabled to continue the use of the copaiba in the quantity stated during a month, at the expiration of which she was almost entirely relieved of her leucorrhœal complaint. The medicine was, in consequence, gradually discontinued; and slightly astringent vaginal injections and washes were made use of. In a short time the menses returned; her mental depression disappeared, with the domestic troubles which had given rise to it; the digestive functions were restored, and Mrs. B.'s health became completely reëstablished.

The case I have just described affords an example of a very serious derangement of health occasioned by mental depression, as well as of the beneficial effects of the prussic acid in gastralgia. But what is more to our present purposes, it exhibits the advantages that may be derived from the administration, with suitable precautions, of the balsam of copaiba in leucorrhœa. It may perhaps be objected, that the cure was protracted beyond the usual limits, and that this circumstance detracts somewhat from the credit I have awarded to the copaiba. But if we bear in mind the complicated nature of the disease in this instance, and the difficulty usually experienced in putting a stop to fluor albus—whatever be the remedy employed, the objection must be found to lose much of its force. For my part, I think it probable that in the instance before us, no other article would have proved more rapidly serviceable; and certain it is, that in consequence of the impaired state of the stomach, and the irritation which had existed at the neck of the bladder, several of the more popular remedies for leucorrhœa would have been completely inadmissible. It is also probable, that if the copaiba had been prescribed before the removal of the gastralgia, it would have acted very injuriously, or at least sufficiently so to necessitate its being laid aside altogether, for its action, as has been stated, is of a stimulating nature, and it cannot, on this account, be regarded as free from detrimental effects so long as the stomach remains in a state of morbid excitement. The truth of this remark will be rendered evident by the details of the following case.

Case III.—In October, 1825, I was requested to attend Mrs. B. a native of New Orleans, who was labouring under an attack of measles. This lady was about twenty years of age; had been two years married; had not borne children, and was generally regular in her catamenial functions. Her husband informed me, that she had been affected with leucorrhœa during the last eighteen months—that this disease had come on in a gradual manner, and had been treated unsuccessfully by means of cold bath, Peruvian bark, and other remedies of the same kind.

Having been consulted by Mrs. B. solely for the exanthematic disease, my attention was directed exclusively to this complaint, from which my patient recovered in the usual period without having experienced any untoward accident, except a copious uterine hæmorrhage which supervened on the fourth day of my attendance: I afterwards lost sight of Mrs. B. for more than a year. At the expiration of this period, her husband called on me, and stated, that on the recommendation of some officious friend, his wife had consulted an elderly German physician, then a resident of this city, concerning her leucorrhœal complaint; that this physician had at first prescribed the Peruvian bark, both by the mouth and in the form of vaginal injections; that not succeeding with these, he had had recourse, in succession, to an immense number of stimulating and astringent articles; that wearied, at length, at the continual changes of nauseous drugs, none of which had produced the desired effect, she had dismissed him, and had consented to apply to me. I further learned, that the patient discharged a very large quantity of matter from the vagina; that she experienced much heat and some pain in the part, and that these symptoms were much aggravated during, and for some time after coition; that during her menses, which, in general continued to appear in a pretty regular manner, the vaginal discharge evidently lessened in quantity; and that the patient had lost a good deal of flesh. Her skin was pale, and of an earthy colour, and generally became rather warmer than natural towards night; her appetite was tolerably good, but the digestive process was slow, and attended with sensations of fulness and uneasiness in the stomach and bowels; she was generally thirsty, and finally, her bowels were very constipated.

From this enumeration of symptoms, I was led to the conclusion that the disease, for which advice was demanded, depended on a high grade of secretory irritation of the vaginal mucous membrane; that this irritation extended probably as high as the neck or mouth of the uterus, and that the internal lining of the digestive tube and the biliary organs were affected in a secondary manner. For the

purpose of removing this morbid state, bleeding from the arm or by leeches appeared to be called for, and were ordered; but owing to the fears and prejudices of the patient it was found impossible to draw blood in any way. It became necessary, in consequence, to have recourse to more slow and less efficient means, such as a low vegetable diet, acidulated and emollient drinks, saline purgatives, rest in a horizontal position, emollient vaginal injections, and tepid baths. At the expiration of ten days I was informed that the leucorrhœal irritation, as well as the gastric derangement, had in some measure diminished, but that the discharge continued as before. The balsam of copaiba was now prescribed in moderate doses, and after a little persuasion Mrs. B. consented to take it in cold chamomile tea. By this means the quantity of matter discharged decreased somewhat in less than a week; but as the copaiba occasioned considerable distress in the stomach, pain in the bowels, and thirst, it was laid aside for two or three days. It may be proper to remark that during the continuance of the gastro-intestinal irritation produced by the copaiba, Mrs. B. became affected with a depression of spirits, amounting almost to melancholy, and alternating with agitation and hysterical symptoms. At the end of the above-mentioned period, I was informed that the whole of these symptoms had subsided; but that the leucorrhœal discharge was again on the increase. The patient was, in consequence, once more placed under the use of the copaiba; but after a few days, owing to a recurrence of the same symptoms, it was again discontinued. It was easy to find, from what was stated by Mrs. B. and her attendants, that although she could not continue the use of the copaiba more than four or five days in succession, and it required two or three days more before the irritation occasioned by it had completely subsided, we were gaining ground on the disease. The plan was on this account persevered in during a few weeks; the vaginal irritation gradually decreased; slightly astringent and tonic injections per vaginam were had recourse to; a more substantial and nourishing diet was allowed, and at the period of my departure for Europe, a few weeks after, Mrs. B. was so greatly restored as to entertain the prospect of a speedy and complete relief from the distressing disease under which she had so long laboured, and for the cure of which a great variety of anti-leucorrhœal remedies had been tried in vain.

There can be no doubt, that in this case, the copaiba, although causing so much irritation of the gastric organs, as to force me to several times suspend it during a few days, evinced considerable power over the leucorrhœal discharge. This we may infer from the

fact, that by its means a disease of already long standing, and which had baffled the efforts of art, and it may be added of empiricism, was, if not completely removed, at least greatly relieved. The patient herself was fully aware of its utility; and nothing, probably, could have induced her to resume so often the use of a remedy of a highly nauseous taste, and producing the unpleasant effects stated, except the conviction that it was producing the desired effects. As regards myself, I frankly admit, that it was only the courage and the wishes of Mrs. B. which induced me to persevere with the copaiba; and that on two or three occasions I suggested the propriety of substituting some other remedy of a less irritating nature.

The second case of leucorrhœa described above, presents an instance of gastric irritation brought on by mental depression. In the third we have an example of the reverse—a state of mental depression, as well as hysterical derangement, produced by a gastric affection arising evidently from the action of a stimulating remedy on a preternaturally irritable mucous tissue.

In the next number of this Journal I hope to be able to offer some observations on the effects of the balsam of copaiba in diseases of the alimentary canal.

ART. II. *Cases of the Epidemic Yellow Fever prevalent at New Orleans in the Summer and Fall of* 1833. By E. B. HARRIS, M. D. [Communicated to Dr. SAMUEL JACKSON, of Philadelphia.]

THE following is the history of twenty cases of the late epidemic fever prevailing at New Orleans. The number Dr. HARRIS writes could have been increased to eighty, with an additional mortality of two deaths.

The treatment pursued in these cases was based on physiological medicine. They furnish an evidence of its applicability to the diseases of the southern regions of our country: of this fact no rational doubt could be entertained, but many who do not understand its *principles*, and do not wish to recommence and continuously prosecute their medical studies, have made this assertion. It may be suspected, this is often done as an apology for indolence, and a justification of an adherence to established routine, rather than from conviction, the result of deliberate examination.

It may be well to say a word in explanation of what is intended

by physiological medicine, as it is grossly misunderstood, or quite as badly misrepresented, by individuals whose position should be a guarantee against either error.

In physiological medicine the pathology of disease is established on the structure of the organs, their vital actions and functions. Disease is a modification in the normal vital condition of structure, (which includes both the solid and fluid elements,) whence proceed change or disorder and disturbance of function and structure as effects. Therapeutics is the appreciation of the modifications caused by medicinal agents in the vital condition of structure; and treatment or practice consists in the adaptation of the therapeutic modification, or vital reäction caused by remedial agents, to the pathological modification or vital reäction of the organs proceeding from morbific causes.

Such are the fundamental principles of physiological medicine. It is rational as opposed to routine medicine. It is opposed to and admits of no quackery, as it requires a profound knowledge of the animal organism, of vital phenomena, and the positive actions of remedial means. This knowledge too is to be governed by the processes of reasoning as applied to each particular case.

Physiological medicine, either designedly or ignorantly, is confounded with the *physiological doctrine* of Broussais. The medical doctrine of this distinguished physician, which is the physiology of irritation, is eminently physiological. It is the only general system of medicine promulgated in France which took physiology for its groundwork. It was, therefore, no presumption in Broussais to name it as he did—the physiological doctrine. The term would have been less applicable in Britain and this country, than in France. Brown, Darwin and Rush, had promulgated doctrines founded exclusively on physiology. The failures of these truly eminent medical philosophers, are to be ascribed solely to the defective state of the physiology of their time. With the paucity of their materials, and the imperfectness of the science, it was not possible for them to erect a durable fabric. The principles of Miller and of Rush, adapted to the physiology of the present time, would approach very nearly the doctrine of Broussais.

The doctrine of Broussais is an advance in the theory of medicine. It has fixed more entirely the ideas of irritation, before exceedingly loose, and given a clearer exposition of the numerous phenomena depending on that vital condition, than any other that had preceded it. It is to Broussais we are indebted for a more perfect knowledge of the chronic irritative and inflammatory diseases, which had been by

the great mass of practitioners wholly misunderstood; and to this knowledge is to be ascribed the present more successful methods of treatment adopted in those affections. The improvements of Broussais in these respects are incorporated in the body of the science, and it is almost forgotten whence they proceeded. In the reäction also, induced by the arrogancy, dictatorial spirit, and offensive manners of the man, are overlooked, in a great measure at the present period, the services rendered by the philosopher and physician. Time, the victor of prejudices, and the calmer of passions, will do justice in this respect.

The doctrine of Broussais will not be more permanent than its antecedents. Its base is too narrow. It is but a stepping-stone in the progress of theory. No general theory of medicine, for a long period to come, can be perfect or lasting. The facts of vitality and organization are too little developed, and too little understood, to admit of an entire theory that will be found unexceptionable. The most that can be done, or that can be expected, is the temporary generalization of the facts as *they are now understood* to render their application to practical purposes more prompt and systematic.

Physiological medicine, or the arrangement and application to practice of the physiological and structural organic phenomena, as they become verified, has this advantage over a mere doctrine. It is not tied down to a fixed set of what are considered positive facts, but which are likely to be disproved as such in the rapid advance of our positive knowledge. Its character is expansive and adapting, repelling nothing that bears the impress of demonstration, and retaining nothing proved to be untrue. As it is the philosophy of organic phenomena applied to the purposes of medical science, every verified fact that comes within its scope, or bears upon its principles, must find its appropriate position and its useful application.

The strict pathology of yellow fever cannot be considered as positively settled. Some of its important facts are determined—others remain obscure. That an intense gastro-duodenitis is its most prominent character—that the primitive symptoms proceed from this source, may be regarded as nearly unquestioned. The dissections of Dr. Physick in this city first attracted attention to this fact, which has since been confirmed by repeated observations. Dr. Rush made the stomach "the seat and throne of the disease." Edward Miller of New York, one of the ablest and most philosophical medical practitioners of this country, assigned the stomach as the source—*fons et origo*—not only of yellow fever, but of all fevers of malignant character.

While this general fact is indisputable, and the leading features of the disease announce in unequivocal language the existence of an intense gastro-intestinal inflammation, there prevails, however, a constant disposition to hæmorrhage, or at least to the escape of the colouring matter of the blood from the inflamed gastro-intestinal mucous membrane. This may be regarded as the specific character of the disease. I have never witnessed a fatal case of yellow fever in which this was absent. Even when no black vomit is ejected during life, it is always found in the stomach on dissection. From the number of autopsies I have assisted at or performed in this disease, I regard this as one of the most positive facts of the disease. In very violent cases the same hæmorrhagic disposition is manifested in other points, as the mouth, the ears, the carunculæ, the bladder.

This symptom is present only in the fatal cases—at least I have never known a recovery when it has existed. There are traditions of some few cases in the epidemics anterior to my personal observations, which commenced in 1805, in which recovery had taken place after black vomit and bloody discharges. They are exceedingly rare.

What is the immediate cause of this hæmorrhagic disposition is unknown. It may reside in the blood itself. But it appears to be regulated by the intensity of the local inflammations. The treatment of the disease should then be directed entirely to the restraining of this last condition. If that be confined below a certain grade, the fatal complication is prevented. The recuperative powers of the organism are preserved, and will prove adequate to the safety of the patient. The physician can accomplish, and should attempt no more. The case is precisely analogous to that of the exanthematous fevers derived from specific contagions, and possessing a specific character. No one attempts to cure the disease. Their danger arises from the intensity of the *local inflammations* that invariably attend them, disturbing the functions of important organs, and disordering the whole constitution of the individual. The protection afforded against these inflammations by a treatment that limits their too great activity, is the extent of our remedial proceedings. No remedies are possessed of specific powers adapted to the specific character of the disease capable of arresting its progress. By mitigating the intensity of local inflammations, fatal complications are prevented, and then the patient recovers. When the too great virulence of the contagious poison or the state of the constitution, or organs of the patient, is such as to occasion inflammations of an activity beyond the reach of our curative operations, disorganization and the destruction of functions essential to vital activity then ensue, and the patient perishes.

In the following cases, reported by Dr. Harris, this course was followed. Neglecting the specific character of the disease, of which we have no positive information, and for which still less do we possess any positive remedy, the whole treatment consisted in the employment of means the most directly calculated to diminish the local inflammation in the organs where they are the most actively developed. The plan is rational, and the success was gratifying. By keeping down the too great intensity of the gastro-intestinal inflammation, the secondary symptoms and the hæmorrhagic disposition were controlled, and the cases remained within the ordinary curative powers of the economy.

Dr. Harris was a resident physician of the Alms-house Infirmary of this city, and he there witnessed the application of the method he has pursued in the treatment of fever. This method is simple. It consists in combating in its acute state, the gastro-intestinal inflammation, and the secondary train of symptoms it excites in the nervous organs, by the most powerful, yet simple and direct of the sedative and antiphlogistic means we possess. These are general bleeding, to limit the two great activity of the general circulation. Capillary depletion to attack immediately the local or capillary affection. Cold, the only true sedative and positive febrifuge, to concur in the same object, and to allay the excitement of fever. Revulsion, accomplished by warmth to the extremities and cold to the head, equalizing the excitement, and preventing cerebral congestions, and epispastics or sinapisms, when the violence of reäction has been subdued. Finally, the employment of the milder purgatives calculated to call forth the intestinal secretions, when the inflammatory condition has been properly combated, terminating its last remains, or carrying off a congestion that may have been formed. Mercurials administered at this period, and in some cases carried to the point of light ptyalism, often are the most effectual for this last object.

The most important of these remedies in the commencing stages, the most *efficient* of all remedies in the acuity of fevers, (to employ an old phrase,) are local depletion and cold. This last is to be employed in ablutions, or persistently to the head and to the abdomen when their temperature is elevated; cold affusions to the head, and injections into the bowels. I know of no remedy that so truly merits the appellation of febrifuge as this last. Its effects in controlling, subduing, and calming a febrile paroxysm are often wonderful. When the temperature is sufficiently low, which must be regulated by the intensity of the febrile heat, it is more prompt and powerful than the most copious blood-letting, while no danger is incurred of producing ex-

haustion should the disease progress, often fatal when too copious evacuations have been practised.

The experience of Dr. Harris of this method of treatment, in the fevers of the southern states, has been sustained by that of Dr. Edward Barton, formerly of Louisiana, but at present of New Orleans. Dr. Barton has published the result of his observations in this Journal, Vol. XI, p. 43, et seq. S. J.]

Case I.—Mr. M'C. æt. 28, sanguine-lymphatic temperament, first summer in New Orleans, was seized, August 20th, 1833, about 6 P. M. with chill, pain in stomach and head and lower part of spine, general uneasiness in his bones. I was called at 7 P. M. and found pulse 140 and full, skin hot, pain in epigastrium, vomits mucus mixed with grumous blood, great stupor, bowels constipated, tongue beginning to be furred and red at edges. Ol. ricin. ℥iss.; injection of ol. ricin. ℥ij., molasses, ℥ss., and mucilage, ℥viij. mixed well. The injection to be repeated every hour until the intestines are fully evacuated. Fifty leeches to epigastrium; cold affusion to head; iced barley water for drink, and diet. 10 *P. M.* The leeches have drawn well; sickness of stomach calmed; head-ache diminished; pulse reduced to 120, and not so full; skin slightly disposed to moisture; bowels freely acted on. Ordered a warm bath, with cold affusion to head while in bathing tub.

21*st*, 6 *A. M.* Still complains of his head; stomach tranquil; tongue furred in middle and red at centre; pulse 110; bowels freely acted on during the night; desire for his iced drinks, as cold water and barley water, which were given often, but in small quantity at a time. Ordered eight leeches behind each ear, warm bath with cold affusion repeated, and injection as before. 12 *M.* Head felt much relieved after the leeches were applied; urinates freely, deep red; pulse 100; skin perspirable; tongue in same condition; head feels but slightly heavy. Continue treatment. 8 *P. M.* Head still feels heavy; bowels have been opened several times in the day; condition otherwise unchanged. Ordered eight leeches to inside of thighs; cold mucilage injection; at 10 P. M. the bath, and affusion to head.

22*d*, 6 *A. M.* Slept several hours last night; feels no pain or uneasiness; redness of tongue at edges much lessened; desire for cold drinks decreased; pulse 90; skin perspirable; a little nausea; urine becoming almost natural. Soda pulv. with tart. acid in effervescence occasionally. 8 *P. M.* Saw him several times during the day; the soda powders relieved the nausea of which he complained; pulse 85, and good; tongue improved in appearance. Mass. ex

hydrarg. grs. v.; arrow root in addition to his barley water; injection of mucilage.

23d, 6 *A. M.* Slept well; bowels free; convalescing; pulse 80. Continue regime.

24th, 6 *A. M.* Continues to improve; stools present a dark aspect. Continue arrow root and barley water.

25th. Condition unchanged; allowed chicken water.

26th. Doing well. Allowed chicken soup.

27th. Discharged, with restrictions as to his diet. On 28th he is up in his room.

Case II.—Mr. Wells, æt. 30, sanguine-lymphatic temperament, first summer in the city, was taken at 8 A. M. August 22d, 1833, with chill, pain in lower part of back and bones. At 10 A. M. I was called, and found him in the following condition:—Greatly frightened, and crying; pulse 130, and full; bowels constipated; heat, and soreness of epigastrium on pressure; skin of abdomen hot; head-ache. Ol. ricin. ℥iss.; fifty leeches to epigastrium; injection of ol. ricin. ℥ij.; molasses, ℥ss.; mucilage, ℥viij. mixed together; the injection to be repeated every two hours, until there are free evacuations. Cold barley water for diet and drink; cold affusion to head. 3 *P. M.* Pulse reduced to 110; leeches drew well; pain in stomach but slight; head-ache diminished; skin hot; tongue becoming furred and red; urine of a deep red, and depositing a lateritious sediment; bowels freely opened. Ordered eight leeches behind each ear; repeat injection; tepid bath, with cold affusion to head; iced barley water. 8 *P. M.* Head-ache lessened after the application of the leeches; bowels freely evacuated; abdomen much diminished; mind less agitated; condition otherwise unchanged. Ordered cold mucilage injection; bath, with cold affusion to head at 10 P. M.; continue cold drinks.

23d, 6½ *A. M.* Slept two or three hours last night; mind much relieved; tongue furred and red at edges; pulse 95; dullness of head but slight; forehead a little disposed to moisture; slight nausea; bowels open. Ordered a warm pediluvium, and pulv. sod. and tart. acid in effervescence. 8 *P. M.* Has passed a tolerable comfortable day; several evacuations from intestines; no uneasiness in head; tongue not so red at edges; pulse 85; urine high-coloured, (red;) nausea relieved; thirst not very urgent. Cool flaxseed injection; continue drinks.

24th, 6½ *A. M.* Rested well last night; pulse 75; bowels open; urine less deep in colour, and sediment not so abundant; tongue not so red at edges, but furred, of a blackish colour in the middle; does

not complain. Thin arrow root by sips every hour or two, in addition to barley water. 8 *P. M.* Saw him during the day; no change. A warm pediluvium; mass. hydr. grs. v. at 10 o'clock.

25*th*, 6½, *A. M.* Has slept several hours during the night, but as he has charge of an extensive concern, and all absent but himself, his mind is either much affected thereby, or by some other cause; he is now shedding tears; otherwise condition unchanged; tongue cleaning off. Mucilage injection. Continue treatment. 8 *P. M.* I find now his condition much changed, and on inquiry ascertain that his friends have been continually coming in and talking to him during the day. His tongue is red and fiery; pulse 110, quick and weak; skin hot; partial insensibility. Tepid bath; continue barley water.

26*th*. Condition aggravated; prostrated; tongue red and chipped; mind so much disturbed as to be delirious; partial insensibility. Arrow root, (thin,) and barley water, with a continuance of injections of mucilage.

In the above condition, but more prostrate, he remained until the 29th, when his pulse became a thread, and I ventured, in opposition to my judgment, and a fear that he would sink during the night, an injection of carb. ammon. in mucilage, every three or four hours. They were continued until next evening, when, no change for the better being perceived, they were discontinued. He was now put in a tepid bath, and confined to arrow root, barley and iced water. About the 5th of September his dryness of tongue and body began to disappear, and on the 7th all diseased appearances were absent. He was now almost a perfect skeleton. Allowed chicken soup. On the 12th he is enabled to walk with assistance. Discharged, with cautions as to regimen.

Case III.—Mr. S. W. æt. 20, sanguine temperament, has been in New Orleans several winters, but went north every summer; a native of Philadelphia; was seized on Monday afternoon, August 26th, 1833, with a slight chill and pain in the head and lower part of the back, succeeded by slight fever. I saw him about 7 P. M. three hours after attack. His pulse was 110, and he complained as above but slightly; his bowels were constipated; slight sickness of stomach. Ol. ricini, ℥j. to be succeeded by injections of ol. ricini, ℥ij. with molasses, ℥ss. and flaxseed mucilage, ℥viij. The injection to be repeated every two hours until the bowels are fully acted on. Twenty leeches to epigastrium; cold affusion to head; cold barley water for diet and drink.

27*th* 7, *A. M.* Head-ache and nausea much relieved; pulse 100; skin but little excited; bowels freely evacuated; tongue slightly

furred and red at edges; urine of a deeper red than natural; pressing on stomach does increase its uneasiness; has an anxiety and dulness of expression I do not like, and is drowsy, although he slept much last night. Ordered injection repeated; tepid bath, with cold affusion to head; continue barley water. 8 *P. M.* Saw him several times in the day, but without any alteration in observation or directions. Bowels freely opened; does not complain of any pain, except uneasiness in the head. There is, notwithstanding, an unnatural fulness of the abdomen for one who has been so copiously evacuated; tongue but little furred or red at edges; pulse 90. Repeat injection; tepid bath, with cold affusion; eight leeches to epigastrium.

28*th*, 7 *A. M.* Still continues to be much disposed to sleep; pulse 85; urine now red, and depositing a lateritious sediment; does not complain of pressure made on epigastrium; bowels several times opened in the night, by the injection; skin cool and pleasant; appearance of fulness in the bowels still continues; tongue cleaning. Injection of cool flaxseed mucilage, to be repeated at 12 M.; mass. ex hydrarg. grs. v. mane et midi. 8 *P. M.* Saw him several times in the day; does not complain; no difference in observation from last notice, except an increase in thirst. Tepid bath; repeat injection; ice to be allowed to dissolve in the mouth; continue barley water.

29*th*, 7 *A. M.* Every organ except the brain seems now to be unembarrassed and performing well its duty; there is continuance of a disposition to drowsiness and listlessness; bowels open, and discharges yellowish; urine approaching to natural; tongue but little furred, and no redness at edges; very slight nausea; pulse 80. Sodæ carb. with tart. acid, in effervescence, to be repeated occasionally if nausea continues; repeat injection of flaxseed mucilage; warm bath, with cold affusion to head. 3 *P. M.* Does not complain; drowsiness much diminished; is tranquil; pulse 80, and good; skin on forehead moist; bowels open and yellow. Thin arrow root, by tea-spoonful at a time, every hour or two; sponge body, when not moist, with whiskey in the night; a warm pediluvium, with mustard.

30*th*, 7 *A. M.* A little restless in the night; all appearances good, except a fulness of abdomen to the touch; desires to eat. Continue treatment.

31*st*, 6½ *A. M.* Saw him several times yesterday, but without any change from last observation; still desires to eat. Allowed weak black tea; continue arrow root. 10 *A. M.* While passing, called in by accident to see him, and, to my surprise, found a change in his visage; lips slightly purpled; listlessness. Inquired, and ascertained that he had heard of

the death of an intimate friend in the house, who died that morning, in the next room to him. Has not urinated since morning. Epispas. to epigastrium; flaxseed mucilage and spts. nitri. dulc. for an injection; continue barley water. At 12 M. he sent to me, and stated he had hiccups, and wanted to know what would relieve him, as they were, to use his own words, "troublesome." I repaired to him immediately, and found his lips and visage still more changed to purple; hiccoughs, which are convulsing. I stated his situation to his brother, who was unaware of the change. Dr. T. Hunt saw him with me at 3 P. M. Passes no urine yet; no delirium, but entire listnessness. Injection of mucilage and spts. nit. repeated; pediluvium with nitro-muriatic acid, ℥j.; epispastics to ankles. At 8 P. M. we saw him again; his condition was unchanged. I was now sent for twenty miles below the city, to see my friend Dr. Rushton, who, on a visit the evening before to a friend, was severely seized himself. My friend Dr. Hunt had the kindness to attend my patients in my absence, and from him I learned, that this patient continued to grow worse, with complete relaxation of the sphincter ani, until the next evening, when he expired. An epispastic was put on the spine in addition to the above treatment. An opportunity for post mortem examination was not offered.

Case IV.—Mr. L. C. æt. 31, a merchant, (first summer residence in the city, although he has resided here since 1829 during winter, spring, and in summer until about 1st August,) sanguine temperament, after a great deal of fatigue in sitting up with sick friends, was affected, August 27th, with slight head-ache, and pain in lower part of back, and uneasiness in bones. Saw him an hour after attack, at 8 P. M. when he presented the following symptoms:—Pulse 100; tongue, on projection, tremulous; uneasiness on pressing epigastrium; skin of abdomen slightly hot; bowels constipated; a little head-ache; pain in his lumbar region, and general uneasiness, as stated; thirst. Fifteen leeches to epigastrium; ol. ricini, ℥iss. to be followed in two hours by an injection of ol. ricini, molasses, and flaxseed mucilage; the injection to be repeated every hour until the bowels are freely evacuated. Cold barley water.

28*th*, 6¼ *A. M.* Leeches drew well; pulse 90; bowels freely acted on; pain of epigastrium and back much relieved; tongue furred and slightly red at edges; dull sensation in head; urine high-coloured, and depositing a lateritious sediment; slept several hours last night; temperature of skin decreased. Six leeches behind each ear; a warm bath, with cold affusion to head; repeat injection; continue barley water. 8 *P. M.* Saw him several times in the day. Doing well; pulse

now 85; does not complain; had several stools; urine less high-coloured; slight sickness of stomach. Pulv. bi-carb. sod. and tart. acid in effervescence; warm pediluvium, with mustard; a cool mucilage injection at 10 P. M. Mass. ex hydrarg. grs. v. to be repeated early in the morning.

29*th*, 6¼ *A. M.* Sickness of stomach relieved immediately after the exhibition of the soda; pulse 80; tongue cleaning; urine becoming natural; skin good; does not complain; desires food. Arrow root in small quantity and often repeated; continue drinks.

30*th*, 6¼ *A. M.* Saw him several times yesterday; doing well; discharges from bowels yellowish, tinged dark.

31*st*. Convalescent; allowed chicken water; forbid to take exercise.

September 1*st*.—Discharged well, with restrictions as to regimen.

Case V.—W. F. æt. 21, a clerk, sanguine-lymphatic temperament, (second summer in the city,) was attacked, September 8th, 1833, with chilliness, head-ache, pain in lower part of back, sickness at stomach. Saw him a few hours after attack, when he presented the following symptoms. Pulse 130, and full; tongue covered with a white fur, and red at edges; pain on pressing epigastrium; skin hot; head-ache; bowels constipated; pain in lumbar region; thirst. Twelve cups to epigastrium and right and left hypochondrium, and six to lumbar region; ol. ricini, ℥iss., to be followed in three hours by an injection of ol. ricini, ℥ij., molasses, ℥j., and mucilage of flaxseed, ℥viij.; the injection to be repeated every two hours, until the bowels are freely acted on; cold affusion to head; cold barley water for diet and drink.

9*th*, 6½ *A. M.* Passed a restless night; pulse reduced to 100, and not so full; head-ache much lessened; sickness of stomach relieved; skin of forehead rather hot; bowels freely acted on; urine of a deep red, and depositing a lateritious sediment; thirst not so great; pain in lumbar region almost entirely abated. Eight leeches behind each ear; repeat injection; ice in small pieces allowed to dissolve slowly in the mouth, in addition to the barley water; tepid bath, with cold affusion to head. 8 *P. M.* Has passed a more comfortable day. Tongue covered with a white fur, but moist, and less red at edges; pulse reduced to 90; head much relieved by the leeches and cold affusion; bowels opened several times; thirst lessened. Injection of cool flaxseed mucilage, and at 10 P. M. a warm bath and cold affusion, as above.

10*th*, 6¼ *A. M.* Passed a tolerable night; slept several hours; pulse 85; tongue less furred and red; does not complain; urine less

deep colour; bowels open. Arrow root in small portions and often repeated; cool flaxseed mucilage injection repeated.

11*th.* Continues much in same condition, except a desire for nourishment different from his arrow root, which was not allowed; he is much prostrated. Continue treatment.

12*th.* Yesterday, after my mid-day visit, he attempted to sit up in bed to stool, and swooned away, from which he, however, soon recovered. His tongue is cleaning, and his condition good. Continue treatment.

13*th.* Continues to improve; stools yellow. Continue treatment.

14*th.* Desires urgently to eat. Allowed chicken soup.

15*th.* Convalescent.

16*th.* Discharged well, with restrictions as to regimen.

Case VI.—Mr. M. æt. 22, fully developed, sanguine temperament, first summer in New Orleans, was attacked very severely, September 5th, 1833, with chill, pain in head, back and bones, sick stomach. I saw him an hour after he was taken, and the following symptoms were observed. Pulse 140, and full; skin hot; abdomen hot, and epigastrium painful, pain increased on pressure; bowels constipated; ardent thirst. Twelve cups to epigastrium, right and left hypochondrium, and six to lumbar region of spine; ℥iss. of ol. ricini, to be succeeded by an injection of ol. ricini, molasses, and flaxseed mucilage, every one and a half or two hours, until the bowels are freely acted on; cold barley water for diet and drink. This was at 10 A. M. 9 *P. M.* Head-ache still continues, but much diminished in severity; tongue furred and red; skin hot; epigastrium painful on pressure; pulse reduced to 120; cups drew well; urine of a deep red; bowels freely opened; thirst continues. Injection repeated; tepid bath with cold affusion to the head; cold drink continued, with ice allowed to dissolve in the mouth.

6*th*, ¼ *to* 7 *A. M.* Passed a restless night, without sleep; bowels several times opened; urine deposites a lateritious sediment; head-ache and other symptoms, as above, unchanged. Five cups to back of neck; injection of cold mucilage; warm bath at 10 A. M. with cold affusion to head. 9 *P. M.* Saw him during the day; pulse now reduced to 100, and much less full; only uneasiness in the head; redness of edges of tongue not so deep; heat of skin greatly lessened; bowels free; urine of a less deep red. Pediluvium; continue barley water; cold to head.

7*th*, 7 *A. M.* Passed again a restless night, (a symptom, as far as my observation extends, in the commencement of yellow fever, of a

favourable character,) with only an hour or two of sleep; tongue coated with a grayish fur, inclining to brown; dullness yet in head; pulse 95, bowels free, and discharges slightly yellow. Five leeches behind each ear; continue treatment. 9 *P. M.* Feels comfortable; does not complain; pulse 90; tongue and other appearances but little if any changed; slight moisture on forehead; bowels open. A pediluvium with mustard; thin arrow root, by tea-spoonfuls, every hour or two; a mucilage injection; barley water or orangeade, which latter he calls for, (thirst much lessened.)

8th, 7 A. M. Rested well; does not complain; much prostrated; pulse 85; tongue cleaning and less red at edges; stools yellow. Continue treatment.

9th, 7 A. M. Saw him several times yesterday; no change in observation, except that his eyes and body are becoming very yellow. He continued without material change until the 12th, when he desired chicken soup, and was discharged well on the 13th, though perfectly yellow. This soon disappeared.

Case VII.—Mrs. C. æt. 22, sanguine-lymphatic temperament, spent the summer of 1831 in the city, has an infant about ten months old, was seized, on September 7th, 1833, at 8 P. M. with pain in head, lower part of back and stomach, preceded by a chill and uneasiness of bones, and languor; bowels constipated. I was called at 9 P. M. but owing to indisposition did not go, but prescribed the following:—Thirty leeches to epigastrium; ol. ricini, ℥jss. to be succeeded by injections of ol. ricini, molasses, and mucilage, in two hours; cold affusion to head; barley water for diet and drink.

8th, 7 A. M. Passed a restless night; pain of head and stomach not much lessened, as the leeches could not be procured, and a few that were applied by the family drew but a small quantity of blood; bowels have been freely evacuated for eight times; pulse 130, and full; skin hot; pain of epigastrium increased on pressure; tongue furred and red at edges; urine of a deep red. Forty leeches to epigastrium; repeat injection; cold affusion to head; continue cold barley water. 6 *P. M.* Head-ache much lessened after the application of the leeches, the bites of which were allowed to bleed; pulse reduced to 115, and less full; heat and pain of epigastrium much less; slight sickness of stomach; urine and tongue as last noticed; bowels open several times in the day. Bi-carb. sod. with tart. acid occasionally, in effervescence; six leeches behind each ear; warm bath, with cold affusion to head; an injection of cool flaxseed mucilage; as thirst is urgent, ice is held in the mouth and allowed slowly to dissolve.

9th, 7 A. M. Slept several hours last night; was much calmed by

the leeches, which drew well, and the cold affusion was most grateful to her; sickness of stomach relieved; tongue furred, white, but redness at edges nearly gone; bowels open several times, but discharges mostly mucus and water; pulse 95; still a slight pain in head; urine becoming of a paler red; thirst not so urgent; skin still warm on abdomen. Mass. ex hydrarg. grs. v. to be repeated at 12 M.; warm pediluvium; cold cloths to head after cold affusion; cold flaxseed mucilage injection; continue barley and iced water. 9 *P. M.* Head-ache but slight; pulse 85 to 88. Add mustard to warm pediluvium; repeat injection; continue treatment.

11*th*, 7 *A. M.* Tongue much improved, and now but little furred; stools darkish-brown; complains but of slight dulness of head; urine nearly natural; pulse 80; skin slightly disposed to moisture, and pleasantly cool. Repeat mustard pediluvium and mucilage injection; thin arrow root in addition to her barley water, (her thirst has been gradually declining.) 9 *P. M.* Condition good; continue treatment.

12*th*, 7 *A. M.* Slept well; desires to eat. Continue treatment.

13*th*. Condition improving; all organs doing their duty. Panada in addition to her other nourishment.

14*th*. Desires imploringly to be permitted to eat more; allowed chicken soup.

15*th and* 16*th*. Discharged well, with restrictions as to regimen.

Case VIII.—D. F. from New York, a youth of sixteen, was here last summer, sanguine-nervous temperament very highly developed, was affected on the 11th of September, 1833, about 11 A. M. with chilliness, pain in bones after exposure on the day before to the direct rays of the sun on the levee, attending to the reception of goods. I saw him about 1 P. M. when he had severe pain in head and lower part of back; pulse 140, and full; skin very hot, particularly over epigastrium and abdomen; pain in epigastrium much augmented by pressure; tongue red and tremulous on projection; bowels constipated; thirst. Ten cups to epigastrium, right and left hypochondrium, five to lower part of back; ol. ricin. ℥j. to be followed in two hours by an injection of oil, molasses, and flaxseed mucilage every two hours until bowels are freely acted on; cold affusion to head; cold acidulated barley water for diet and drink. 8½ *P. M.* Feels a little relieved by what has been done; the cups drew well; pulse 130; pain in head still intense; bowels freely acted on; skin hot; strong desire for cold drinks; tongue becoming much furred and red at edges; stomach not so painful on pressure; urine of a deep red, and depositing a lateritious sediment. Four cups to

nape of neck; repeat injection; at 10 P. M. a tepid bath, with cold affusion to head; ice in gauze allowed to dissolve in the mouth; occasional sponging the body during night with whiskey, and cold to head.

12*th*, 6¼ *A. M.* Passed a restless night; pulse 120; tongue greatly furred, white and red at edges; bowels open several times last night; head-ache continues, but diminished in violence; slept none; urine and other symptoms as noticed, except a slight pain in stomach, with nausea. Cold flaxseed mucilage for injection; two cups to epigastrium, which he strongly protests against; tepid bath, with cold affusion to head; carb. sod. and tart. acid occasionally in effervescence.

8½ *P. M.* Saw him during the day, and directed repetition of cold injection; pulse 115; head still painful, yet slight sickness of stomach; condition otherwise unchanged. Repeat injection; tepid bath, with cold affusion, to remain in the bath for twelve or fifteen minutes; sponge body every hour or two through the night with whiskey; continue drinks.

13*th*, 6½ *A. M.* Passed another restless night; pulse 105, and less full; head-ache much lessened; not so furred a tongue, nor redness of edges; urine less deep in colour; skin too warm, and not perspirable; bowels open in the night; thirst continues; sickness of stomach relieved. Repeat injection; tepid bath, with cold affusion to head, and cloths wrung out of iced water constantly to head after the affusion; mass. ex hydr. grs. iv. to be repeated at 12 M.; continue drink; orangade as he desires it. 8½ *P. M.* Saw him during the day; pulse 95; head still aches; condition unchanged; the family became alarmed, and Dr. Hunt saw him with me. Eight leeches behind each ear; repeat bath, with cold affusion to head; repeat injection; continue sponging body with whiskey; drinks continued.

14*th*, 6¼ *A. M.* Was much relieved by the leeches; bowels open; head aches but slightly; complains of a little pain when pressure is made at region of scrobic. cord.; pulse reduced to 85; skin disposed to moisture, and greatly reduced in temperature; tongue less furred, and redness of edges almost absent; slept several hours in the night; is extremely sensitive, and fears the application of a cup to seat of pain in epigastrium. One cup to scrobic. cord.; repeat injection, and bath with cold affusion; a little thin arrow root in addition to his other drink. 8 *P. M.* Saw him in the day, and directed repetition of injection; pulse now 80; urine assuming a natural appearance; tongue cleaning; skin moist; slight nausea. A warm pediluvium, with addition of mustard; repeat injection; a small epispastic to epigastrium, to remain on for three or four hours; continue sponging

abdomen with whiskey every two or three hours; otherwise continue treatment.

15*th*, 6½ *A. M.* Passed a comfortable night; rested well; discharge from bowels assuming a dark colour, and of some consistence, and does not complain since the removal of the epispastic, which entirely relieved sickness of stomach; tongue nearly natural; pulse 80. Continue treatment.

16*th*, 7 *A. M.* All organs in a good condition; desires to eat; allowed a small piece of toast, and weak black tea.

17*th and* 18*th*. Allowed chicken soup, and discharged well on 19th, with restrictions as to regimen; he is much reduced.

Case IX.—Mr. A. B. H. a merchant, has been in New Orleans several years, but absent for the last two or three summers, most of the time to Omoa, Tuxillo, &c.; he is of a sanguine temperament, and arrived within a week from Omoa; æt. 32. He was taken with a chill and pain in his bones, and sick stomach, September 13th, about 12 M. I was sent for, but did not see him until 2 P. M. when he presented the following symptoms:—Pulse 135; bowels constipated; tongue red and tremulous on projection; severe pain in head and lower part of back; thirst great; skin hot. Twelve cups to epigastrium, right and left hypochondrium, six to lower part of back; ol. ricin. ℥iss., to be followed every two hours by oil, molasses, and mucilage, as an injection, until bowels are freely acted on; cold barley water for diet and drink. 7 *P. M.* Pulse reduced to 115, and less full; tongue furred and red at edges; bowels acted on several times; urine of a deep reddish colour; pain in head, back, and stomach much lessened after the application of the cups, which drew well; abdomen hot; thirst continues. Repeat injection; and at 9 P. M. a tepid bath, with cold affusion to head; continue barley water iced.

14*th*, 7¼ *A. M.* Passed a restless night; bowels opened four or five times during the night; pain in head, particularly across the eyebrows; urine deep as last noticed, and depositing a lateritious sediment; no pain or sickness of stomach; pulse 110; skin reduced slightly in temperature; thirst not so intense. Warm bath with cold affusion to head; an injection of cold mucilage; continue iced barley water; four cups to nape of neck. 9 *P. M.* Visited him during the day; head much relieved after cupping; tongue furred, as last noticed, but redness of edges decreased; pulse 100; bowels open; urine not so high coloured; temperature of skin becoming more natural; does not complain. ℞. Mass. ex hydrarg. grs. v. nocte et mane.

15*th*, 6¼ *A. M.* Passed a tolerable comfortable night, having slept several hours; pulse 90; bowels open; skin disposed to moisture; tongue beginning to clean; not much thirst. A warm pediluvium; thin arrow root by tea-spoonfuls at a time every half hour or hour; cool mucilage injection; continue barley water. 9 *P. M.* Pulse 85; complains of slight uneasiness of head; urine nearly natural. A warm pediluvium, with the addition of mustard; cool mucilage injection repeated; continue barley water and arrow root.

16*th*, 7 *A. M.* Bowels assuming a dark colour, and of some consistency; no uneasiness in head; tongue yet furred in middle, but no redness of edges; skin and pulse good. Continue treatment, with the addition of the juice of an orange, which he desires.

17*th*, 7 *A. M.* Saw him last evening, but without observation; he slept well; desires food, which was refused; continue treatment.

18*th*. All disease gone; stools yellow; desires to eat. Allowed weak black tea and toast, and chicken water during the day.

20*th*. Discharged well, with restrictions as to regimen.

Case X.—Mr. H. a bookseller, æt. about 35, has been in the city for twelve or fourteen years, temperament sanguine-lymphatic, the latter most strongly developed, tall stature, has his family across the lake, was seized September 13th, 1833, about 1 P. M. with chilliness; pain in bones; languor, succeeded by fever; severe pain in head, lower part of back, and stomach; (he had been in the habit for some time of taking a small quantity of brandy and water once or twice daily.) I was sent for, and saw him at 3 P. M. when the following observations were made:—Pulse 125; skin hot; pain in head, lower part of back and epigastrium, the latter increased on pressure; tongue red and tremulous on projection; bowels constipated; uneasiness of mind; thirst great for cold drinks. Ol. ricin. ℥iss. to be succeeded by an injection of oil, molasses, and flaxseed mucilage in two hours, to be repeated until bowels are freely acted on; ten cups to epigastrium, right and left hypochondrium, six to lower part of spine; cold barley water for diet and drink. 9 *P. M.* Pulse reduced to 110, and less full; temperature of skin diminished; tongue beginning to be furred and red at edges; sensibility of epigastrium and pain in head lessened; urine of a deep red colour; bowels have been acted on several times; the cups drew well; thirst continues. Repeat injection; tepid bath, with cold affusion to head, if head-ache then not relieved, eight leeches behind each ear; continue drink.

14*th*, 6 *A. M.* Passed a restless night; the leeches were not applied, as the pain in head diminished; urine depositing a lateritious sediment; tongue furred deeply, and red at edges; pulse 105; skin of

abdomen hot; bowels open during the night; a little sickness of stomach. Apply the leeches as directed last night; warm bath, with cold affusion to head; cold mucilage injection; carb. sod. and tart. acid occasionally in effervescence; continue barley water and ice water in small quantity. 9 *P. M.* Head much relieved; tongue not so furred and red; bowels open several times during the day; pulse 95; urine as noticed; sickness of stomach relieved; skin of forehead a little disposed to moisture. Mass. ex Hydrarg. grs. v.; a warm pediluvium; continue treatment.

15*th*, 6 *A. M.* Got into a slight perspiration after the pediluvium; slept several hours in the night; complains only of a slight fulness in the head; pulse 90; tongue improved; urine less deep in colour. A warm bath, with moderate cold affusion to head; injection of cool flaxseed mucilage; thin arrow root, in addition to other drinks. 9 *P. M.* Visited him during the day; feels much relieved; abdomen reduced very greatly in size; bowels open. Continue treatment.

16*th*, 6 *A. M.* Stools now present a dark colour, and more consistence; does not complain; tongue improving. A warm pediluvium with mustard added; continue treatment.

17*th and* 18*th*. Continues to do well.

19*th*. Desires porteree—allowed a small portion at a time, also chicken soup.

20*th*. Discharged well: and on 23d, was enabled to go across the lake.

Case XI.—Mr. A. M. a merchant, æt. 25, sanguine-lymphatic temperament; the latter most strongly developed; of a very tall stature; has been in New Orleans for three summers; had intermittent fever last spring, and is subject for some time during every change of weather, when it becomes damp and cool, to attacks of St. Anthony's fire, in many of which I have attended him; had a severe attack not more than ten days ago.

He was seized about 11 A. M. with chilliness, pain in head, back, and stomach, succeeded by high fever. I was called, but being absent did not see him until 4 P. M. when the following symptoms were observed:—Intense pain in head, stomach, and lower part of back; pulse 140 and full; bowels constipated; skin hot; pain of epigastrium increased on pressure; tongue red and tremulous; very much alarmed. Twelve cups to epigastrium and right and left hypochondrium; eight to lower part of back; ol. ricini, ℥iss., to be followed by injections in two hours of oil, molasses, and mucilage, repeated every hour until bowels are freely acted on; cold affusion to

head, and cold cloths constantly applied to abdomen; acidulated barley water for diet and drink. 8½ *P. M.* Bowels now operating freely; tongue red at edges and furred brownish; pulse reduced to 120; pain in head, back and stomach, much relieved; urine of a deep red; thirst great. Tepid bath, with cold affusion to head; ice in small pieces allowed slowly to dissolve in the mouth; sponge body with cold water every hour or two; repeat injection; continue barley and iced water.

16*th*, ¼ *to* 7 *A. M.* Passed a restless and uncomfortable night; is much reduced; head aches; bowels freely evacuated; tongue furred brown in middle, and very red at edges and sides; slight pain of epigastrium, increased on pressure; skin of abdomen hot; strongly solicits ice, and a repetition of bath with cold affusion; urine as last noticed; pulse 110, and not so much force Two cups to epigastrium and four to nape of neck, all of which drew well; repeat bath with cold affusion; injection of cold mucilage; sponge body every hour or two with whiskey; continue drink; repeat injection at 12 M. 9 *P. M.* Saw him during the day, but without material change; pulse is now reduced to 100; head-ache absent, but to a dull sensation; complete evacuation of bowels; no pain of stomach; temperature of skin lessened; tongue less furred and red; urine as last noticed. Repeat bath with cold affusion, to be put in the bath without any exertion on his part; if dullness of head continues, to have five leeches behind each ear; a cool flaxseed mucilage injection; barley and iced water continued.

17*th*, 7 *A. M.* Slept several hours last night; as dullness of head decreased, did not apply the leeches; is very excitable; pulse reduced to 90; skin assuming a disposition to slight moisture; urine not so deep as last noticed; scarcely uneasiness in the head; tongue becoming more natural; skin of abdomen rather excited; bowels open and now yellowish; thirst much diminished; greatly prostrated. Thin arrow root in addition to barley water, repeated every hour or two; continue sponging abdomen with whiskey, and occasionally a cool flaxseed mucilage injection. 8½ *P. M.* About 12 o'clock this morning slight sickness of stomach came on, which is now rather increased than diminished, with a disposition to eructation; skin feels pleasant over abdomen and body; pulse 85, and not far from natural; bowels open and yellow in colour. When sickness of stomach came on, carb. sod. with tart. acid, in effervescence, was occasionally administered with but partial relief; much alarmed, and greatly prostrated; (he has been made to use, as all the others were, a bed-pan from the second day of attack.) Emplas. epispas. fort.,

four by six inches, to epigastrium; hot pediluvium with mustard; arrow root every hour or two by tea-spoonfuls; flaxseed mucilage injection.

18*th*, 6½ *A. M.* Epispastic has raised well, and has just been removed; entirely relieved of sickness of stomach a few hours after it was applied; tongue cleaning and good; every organ seems to be doing its duty well; desires the juice of an orange, which was allowed. Continue arrow root.

19*th*, 7 *A. M.* Continues to do well; saw him last evening, but without an additional observation; very slowly convalescing; desires to eat. Continue arrow root.

20*th*. As last reported. Allow weak black tea and toast, and chicken water occasionally by table-spoonfuls in the day.

21*st*. Great desire to eat more; allowed a soft-boiled egg in addition for morning, and chicken soup through the day.

22*d*. Is so well that he can sit up for a short time to-day. Continue regimen. From this day to the 24th he improved very rapidly, and is enabled to walk about his room. Discharged, with restrictions as to regimen.

Case XII.—Mr. J. T. æt. about 26, sanguine temperament, full habit of body, ordinary stature, first summer in New Orleans, was seized this morning, September 14th, (four miles below the city, where he slept every night, at the country-seat of Mr. L.) at 2 o'clock, with chilliness, pain in his bones, and sick stomach, followed by fever, head-ache, &c.; his brother, who was with him gave him ℥iss. of castor oil. I was sent for, but did not reach him until 10 o'clock, when the following observations were made. Pulse 140 and full; is constipated; oil that he took has not acted; great heat and pain increased on pressure of epigastrium; tongue furred in middle and red at edges and sides; thirst for cold drinks intense; pain in head very severe. Repeat ol. ricin. to be succeeded in two hours by oil, molasses, and mucilage, as an injection, repeated every hour until bowels are finally acted on; twelve cups to epigastrium and right and left hypochondrium, and six to lower part of back, (they were applied by myself, as it would occupy too much time to send to the city,) they drew between xx. and ℥xxiv. of blood; this evening a tepid bath with cold affusion to head; repetition of injection also; barley and iced water in small quantity, and often repeated.

15*th*, 8½ *P. M.* Bowels acted on eight or ten times since I saw him; still head-ache; pulse 120, and less full; great diminution of pain in epigastrium; tongue furred and red; urine of a deep red, and

depositing a lateritious sediment; diminution in temperature of body; passed a restless night; thirst; was delighted with his cold affusion and bath, (cold cloths were applied also after the cold affusion.) Three cups to epigastrium; three to back of neck; warm bath with cold affusion; cold flaxseed mucilage injection. This evening at 9 o'clock repeat bath and affusion and injection.

16*th*, 8½ *A. M.* Pulse reduced to 100; tongue still covered with a white fur, but less red at edges; urine not so deep a red; bowels acted on several times in the night; a little sickness of stomach; no pain of epigastrium on pressure; dull sensation in head; temperature of skin improved; passed a restless night. Warm bath with cold affusion to head; cool mucilage injection; carb. sod. with tart. acid occasionally in effervescence; barley and iced water continued; if dullness of head not relieved by 9 o'clock this evening, eight leeches behind each ear.

17*th*, 8½ *A. M.* Passed a restless night, but slept two or three hours; sometimes a little wandering when dozing; the leeches were not well applied, and did not draw at all; stools darkish, and more consistent than before; pulse 85; condition otherwise much improved; is cheerful, and desires to eat something; no sickness of stomach; temperature good; urine almost natural. A little thin arrow root every hour or two; repeat injection of mucilage; continue cold drink, although thirst not urgent; owing to the extreme solicitude for this patient, I continued to visit him again at 5 P. M. when no change for the worse had taken place. This evening at 9 o'clock a warm pediluvium with mustard, and if any uneasiness of head comes on, a cool mucilage injection; continue otherwise treatment.

18*th*, 8½ *A. M.* Slept several hours last night, and rested well; no indication of wandering; tongue moist, and nearly clear; pulse 80; skin good; does not complain; bowels open, and yellow; still desires to eat. Continue treatment; to calm him and procure sleep this evening if necessary, five drops of tinct. op. Rousseau.

19*th*, 8½ *A. M.* Slept several hours last night; took the tinct. op. Rousseau about 12½ A. M. which composed him; was a little restless previously; bowels open; skin good; tongue clean; does not complain, except of very slight disposition to nausea; desires to eat; thirst gone. Emplas. epispas. four by six inches to epigastrium, to remain on for four or five hours; continue treatment. I left him about 11 o'clock, and his brother came with me to the city, not having left him before for any length of time during his illness; he slept composedly during his absence; the brother returned about 3 o'clock, and found him tranquil and composed, but wishing his blister

removed, which was done; all sickness of stomach removed; I left positive instructions if any change took place to have a messenger despatched forthwith for me.

On my visit of the 20th, same hour as the preceding days, I found that his condition was hopeless, resulting from a violation of my direction in permitting him to get up to stool; he fainted, and the injury done was now too late to be repaired; his brother and a friend who had gone down the afternoon previous were so deluded, that until my arrival they considered him doing well; I found his pulse scarcely perceptible; low muttering delirium; picking of the bed-clothes; tongue and teeth, (sordes,) blackish; brandy injections were repeatedly given; and flying sinapisms to extremities; (deglutition was soon lost;) the injury sustained was past renovation; he died at 12 o'clock; a post mortem examination could not be effected.

Case XIII.—Mr. A. C. W. a merchant, second summer in New Orleans, æt. 26, sanguine-lymphatic temperament, the former most developed, ordinary stature, was seized with chilliness, pain in bones, sick stomach in the night, about 12½ o'clock, September 16th, 1833. I was sent for, but did not see him until 2½ A. M. and found him in the following condition:—Pulse 140, and full; costive habit of body; skin hot; great sensibility of epigastrium on pressure; tongue red and tremulous when projected; pain of head and lower part of back very severe; ardent desire for cold drinks, particularly iced water. Twelve cups to epigastrium, right and left hypochondrium; and eight to lower part of spine; ol. ricini, ℥iss.; to be followed by injections of oil, molasses, and mucilage, every hour until bowels are freely acted on; cloths dipped in cold iced water to head; iced barley water, and water in small quantity at a time for diet and drink.

6½ *A. M.* Cups drew well, with much relief to head and back and stomach; pain in head; tongue furred, and red at edges and sides; bowels freely evacuated; pulse reduced to 115; urine of a deep red; diminution of temperature in skin slight; sickness of stomach; thirst continues, and cold drinks and application to head most grateful. Repeat injection; tepid bath with cold affusion to head; continue treatment, with addition of carb. sod. and tart. acid, occasionally in effervescence. 9 *P. M.* Saw him several times during the day, without difference in observation; his bowels have been acted on four or five times; head still aches; pulse 100; other condition as last noticed; has been drowsy in the day; sickness of stomach relieved. Four cups to nape of neck; warm bath with cold affusion to head; a cool mucilage injection; continue treatment.

17*th*, 6½ *A. M.* Head much relieved by thecups; pulse 90; tongue

a little less red at edges, but furred, as noticed, inclining to a brownish-white; urine deposites abundantly a lateritious sediment; skin disposed to moisture on forehead; slept two or three hours last night; slight dullness of head, and nausea. Carb. sod. occasionally repeated; a cool mucilage injection; a warm bath; continue treatment. 9 *P. M.* Dulness in head still continues; sickness of stomach relieved; bowels open; pulse and other appearances unaltered; except a slight diminution in thirst. Two cups behind each ear; a warm pediluvium; continue treatment; repeat injection. I remained to cup him; while they were applied the candle by accident set fire to the mosquito-net, I instantly pulled it down and extinguished it, but it so alarmed him that he sprang out of bed on the floor; he returned to bed in a very short period, not so much agitated as I feared.

18*th*, 6½ *A. M.* Passed a restless night until 2 o'clock this morning, after which he slept several hours; head aches, which is not so severe as I dreaded; bowels open; forehead warm; tongue of a dark-brown fur, with the papillæ projecting through it; pulse in same state as noticed; urine as deep in colour, without depositing sediment; no sickness of stomach; skin warm over epigastrium. Eight leeches behind each ear; warm bath with cold affusion to head; a cool mucilage injection; continue treatment. 9 *P. M.* Paid several visits to him in the day; head is entirely relieved by the leeches, &c.; has slept several hours; tongue less brown, and papillæ not so projecting, edges diminished in redness; urine not so deeply coloured; pulse 85; skin nearly natural. A warm pediluvium with mustard, and at 8 o'clock a cool flaxseed mucilage injection; continue treatment. Saw him again at 9 P. M. but without any change for the worse, except a little drowsiness; the injection was directed to be repeated.

19*th*, 6½ *A. M.* Rested well last night, yet a little drowsy; pulse 80; skin disposed to be perspirable or moist; tongue cleaning and improving; urine approaching natural; thirst absent; desires to eat; bowels open and yellowish. Thin arrow root, by tea-spoonfuls, every hour or two; continue treatment.

21*st*, 7 *A. M.* Continues to improve; saw him again last night; desires urgently to eat. Allowed in addition weak black tea and a small piece of toast; this afternoon chicken water.

22*d*. Doing well; nourishment agreed well with him; desires this morning a soft-boiled egg, which was allowed; chicken soup through the day.

23*d and* 24*th*. Discharged well, with restrictions; is up in his room.

Case XIV.—Mr. C. H. H. a merchant, third summer in New Orleans, æt. about twenty-eight, sanguine-lymphatic temperament,

the former most developed, was seized, Wednesday, September 18th, about 10 A. M. with chilliness, pain in bones and back, nausea, &c. I was sent for, but being absent from the city, did not see him until 1 P. M. He had taken, about 10½ o'clock, ℥jss. of castor oil. The following observations were made when I saw him. Pulse upwards of 140 and full; severe pain in head, lower part of back, and epigastrium; the latter much increased on pressure; skin hot; tongue red; bowels constipated; thirst intense for cold drinks. Twelve cups to epigastrium, right and left hypochondrium, and six to lower part of back; ol. ricini repeated, to be succeeded by an injection of ol. ricin. ℥ij., molasses, ℥j., mucilage, ℥viij. mixed together, in two hours, and repeated every hour until there are free discharges from the intestines; cold cloths wrung out of ice water constantly applied to head; iced water and barley water in small quantity, and often repeated, for diet and drink. 8 *P. M.* Feels much relieved since the application of the cups, which drew well; bowels evacuated four or five times; still severe head-ache; pulse reduced to 120, and not so full; is disposed to laugh constantly; tongue beginning to be furred; urine of a deep red. Forbid all company except his nurse; a tepid bath, with cold affusion to head; repeat injection; sponge body every hour with whiskey; ice in gauze allowed slowly to dissolve in mouth, otherwise continue drinks. Four cups to nape of neck.

19*th*, 6½ *A. M.* Passed a restless night; pulse 110; cups drew well, and greatly relieved head; bowels open freely in the night; skin reduced in temperature, and pain of epigastrium diminished on pressure; tongue covered with a white fur and projecting papillæ, and red at edges; thirst not so intense; urine depositing a lateritious sediment; slight nausea; more tranquil, and assuming an usual appearance from such symptoms. Soda pulv. with tart. acid occasionally in effervescence; warm bath with cold affusion to head; a cool mucilage injection; continue treatment. 8 *P. M.* Saw him during the day; pulse now 95; head relieved, excepting a dull uneasy sensation; tongue very much furred; otherwise condition unchanged; nausea relieved. Eight leeches behind each ear; repeat bath with cold affusion; a cool mucilage injection; mass. ex hydrarg. grs. iv. nocte et mane; continue treatment.

20*th*, ¼ *to* 7 *A. M.* Head relieved; slept several hours last night; pulse 85; no nausea; tongue assuming a brownish aspect, but papillæ much less projecting, and less redness at edges; several stools in the night; skin disposed to moisture; urine pale and deposites less sediment; thirst less. A warm pediluvium with mustard; thin arrow root by tea-spoonfuls every hour or two; continue barley water, and

the piece of an orange as it is desired. 8 *P. M.* Has had several alvine discharges of a yellowish colour; tongue improving; condition otherwise improving. Repeat cool flaxseed mucilage injection and warm pediluvium with mustard; continue arrow root, &c.

21*st*, 7 *A. M.* Slept several hours last night; pulse 80; skin good; tongue still a little dark-coloured, but cleaning; urine nearly natural; stools yellowish; thirst nearly gone. Continue treatment, increasing the arrow root.

22*d*. Condition improving; desires to eat. Continue treatment.

23*d*. Tongue nearly natural; does not complain; desires to eat. Allowed jelly in addition to his arrow root.

24*th*. Improving; his appetite greatly increased. Allowed black tea with boiled milk and toast, and chicken water during the day.

25*th and* 26*th*. Chicken soup; a soft-boiled egg. Discharged well, with cautions as to diet and regimen.

Case XV.—Mr. J. V. a merchant, Frenchman, æt. 36, first summer in New Orleans. I was requested to visit him in consultation with Dr. Lacroix, Tuesday, September 17th, at 1 P. M. From Dr. L. I learned that he had been taken with chilliness, pain in bones, back, and epigastrium, succeeded by fever, on the Saturday previous. When I saw him, the following observations were made. He had suppression of urine since the previous afternoon; tongue deeply furred with projecting red papillæ, and red at edges; pulse 140, and quick; bowels had been acted on by injections of Cassia fistularis; epigastrium hot and painful on pressure; pain and heat in region of bladder; no turgidity; slight pain in lower part of back; has been taking table-spoonful of saline draught every hour or two since suppression of urine came on; thirst; slight delirium. Four cups to left hypogastric region, four to lower part of back, four to epigastrium; injection of ol. olivæ, molasses, and mucilage; tepid bath with cold affusion to head; mucilage sem. lini. with spts. nit. dulcis for drink; a warm flaxseed poultice to hypogastric region after application of cups; iced barley water, and ice in small pieces allowed slowly to dissolve in the mouth.

18*th*, 7¼ *A. M.* Urinated freely last evening; pulse reduced to 110; redness of tongue lessened; bowels open; urine of a deep red colour, (or brick;) no pain in epigastrium or lumbar region; temperature of skin diminished, as also thirst; no delirium; slept several hours last night. Repeat bath with cold affusion; a cool mucilage injection; continue treatment. 4 *P. M.* Pulse 95; tongue less furred and red; bowels open; otherwise no change in condition. A cool

mucilage injection; at 9 P. M. bathe feet in hot water; continue treatment.

19*th*, 7 *A. M.* Passed a restless night; pulse 90; skin but little excited; urinates freely and much paler; tongue improved and cleaner; his mind is disturbed in relation to his business, and a little flighty; bowels open; thirst lessened. Cold affusion to head; a warm pediluvium with the addition of mustard; a cool mucilage injection; exclude company; five leeches behind ears. 8 *P. M.* Feels calm; no flightiness after the affusion and leeches. Continue treatment.

20*th*, 7¼ *A. M.* Slept several hours last night; bowels open and yellowish; pulse 80; tongue cleaning; skin disposed to moisture; still a slight injection of eyes. A cool mucilage injection; thin arrow root; continue treatment. 8 *P. M.* Slept several hours during the day. A warm pediluvium, with mustard; repeat injection; continue treatment.

21*st*, 7 *A. M.* Slept several hours last night; all organs appear to be performing their duty; tongue scarcely furred; bowels open and yellowish; desires to eat. Continue treatment.

22*d*. Doing well; black tea and toast, and chicken water through the day.

23*d*. Appetite greatly increased; desires and allowed a soft-boiled egg for morning, chicken soup through the day.

24*th*. Is able to be up in his room; discharged with restrictions.

Case XVI.—Mr. J. S. P. æt. 20, second summer in New Orleans, sanguine-lymphatic temperament, was taken in the morning of September 25th, 1833, with chilliness, nausea, pain in bones, &c. This was about 10 o'clock. I was sent for, but did not, (owing to absence,) visit him until 1 P. M. when I found him covered up with thick blankets, (although a hot day,) and in a forced profuse perspiration; severe pain in head, lower part of back and epigastrium, the latter increased on pressure; tongue tremulous and red; skin hot; pulse 140, and full; bowels constipated; considerably agitated; great thirst. The covering directed to be removed, so as not too suddenly to check transpiration; warm or tepid lemonade occasionally for drink; ol. ricin. ℥iss. to be succeeded every two hours by injections of oil, molasses, and mucilage, until alvine discharges are freely produced; ten cups to epigastrium, right and left hypochondrium, four to lower part of back. 8 *P. M.* Owing to the injection pipe not being sufficiently large, the injections have not had the desired effect; bowels have only been once acted on; much relief of head, back, and epigastrium; pulse 120; tongue beginning to be furred; urine of a deep

red colour; skin warm; perspiration gradually declined; thirst as above. Repeat injection as directed; tepid bath, with cold affusion to head; ol. ricin. ℥j.; cold barley water for diet and drink; sponge body every two or three hours during night with whiskey.

26*th*, 6½ *A. M.* Passed a restless night; bowels freely opened; pulse 100, and not so full; temperature of skin much reduced; tongue covered with a white fur, (papillæ red and projecting,) red at edges; urine as noticed, and depositing a lateritious sediment; slight nausea; thirst not so intense; pain in head, back, and epigastrium absent, except a dull sensation in head; skin of forehead hot. Tepid bath, with cold affusion to head; repeat injection; sponge body every hour or two with whiskey; ice slowly allowed to dissolve in mouth, and if dullness of head continues to 12 M. four cups to nape of neck; carb. soda with tart. acid in effervescence occasionally; continue treatment. 8 *P. M.* Saw him since last report; head so much relieved, that the cups were not applied; pulse 95; skin rather warm; sickness of stomach removed; bowels entirely free; other symptoms not materially varied. Warm bath, with cold affusion to head; cold mucilage injection; continue occasional sponging; continue treatment.

27*th*, 6½ *A. M.* Slept several hours last night; pulse 90; injection passed soon after its administration; skin less hot, and slightly disposed to moisture on forehead; tongue furred, but papillæ less projecting, and not so red at edges; urine as noticed; thirst much decreased. Repeat cold mucilage injection; a warm pediluvium; thin arrow root by tea-spoonfuls. 8 *P. M.* But little change since last visit; bowels open and discharge yellowish. Repeat injection; add mustard to pediluvium, and repeat it; occasional sponging continued; continue treatment.

28*th*, 6½ *A. M.* Slept several hours last night; pulse reduced to 85; skin pleasant to touch; tongue improving; bowels open; urine improving fast; thirst nearly absent. Continue treatment.

29*th*. Tongue nearly natural; all organs seem to be regaining their normal action; pulse 80; slept well; desires to eat. Chicken water, and continue treatment.

Was discharged well October 1st.

Case XVII.—Mr. S. æt. 30, sanguine temperament, second summer in New Orleans, was taken October 5th, 1833, with chilliness, pain in bones, back, and epigastrium, succeeded by fever, head-ache, &c. Dr. Barton saw him a few hours after attack, and detracted blood to the amount of twenty-four or thirty ounces by the lancet; ordered injections of ol. ricin., molasses and mucilage, every two or three hours, until bowels were freely acted on, (they were consti-

pated;) cold to head; barley water for diet and drink. Dr. B. having to be absent from the city for a week, requested my attendance upon him.

Oct. 6*th*, 7 *P. M.* I found him in the following state:—Pulse 120; bowels freely acted on; pain of epigastrium slight on pressure; abdomen and skin hot; intense pain in head; tongue furred, and red at edges; eyes injected; thirst great; urine of a deep red, and depositing a lateritious sediment. Repeat injection; tepid bath, with cold affusion to head; sponge body during the night every hour or two with whiskey, and should head still continue painful after the affusion, eight leeches behind each ear; ice in small pieces allowed slowly to dissolve in mouth, in addition to cold barley water.

7*th*, 7 *A. M.* After the bath and affusion, he was so much relieved, that the leeches were not applied; slept several hours; pulse reduced to 90; skin much improved, and not far from natural; bowels freely opened; fur of tongue a little blackish in the centre; thirst greatly diminished; no pain in epigastrium; otherwise unchanged. A cold mucilage injection; occasional sponging; continue treatment. 6 *P. M.* Condition but little varied since morning, except now a slight pain in the head. Repeat bath, with cold affusion; occasional sponging continued; continue treatment.

8*th*, 7 *A. M.* Passed a restless night; appearance improved; otherwise no excitement felt; pulse 80; a little sickness of stomach, the consequence of neglect of his attendants permitting some exertion when getting out of the bathing-tub, which brought on syncope; tongue but little changed in colour in centre, but redness of edges nevertheless; bowels open; urine deposits less sediment, and more pale; not much thirst; skin good. A sod. pulv. with tart. acid occasionally in effervescence; a warm pediluv. with mustard; a cool mucilage injection; desired and allowed the juice of an orange; continue barley water. 6 *P. M.* No sickness of stomach; tongue improved, and beginning to clean; does not complain. Continue treatment.

9*th*, 7 *A. M.* Slept well; desires to sit up, but forbid; all organs fast assuming their normal actions. Continue treatment.

10*th*, 7 *A. M.* Continues to improve; desires to eat, allowed arrow root in small quantity at a time.

11*th*. Tongue clean; bowels open and yellowish evacuations; convalescent; allow chicken water.

12*th*. Continues to improve; appetite greatly increased. Chicken soup in the day, black tea and toast for morning.

14*th*. Discharged well.

Case XVIII.—Mr. H. æt. 30, sanguine-lymphatic temperament,

second summer in New Orleans, an intimate friend of mine, was seized about 6 P. M. August 26th, 1833, with chilliness, pain in bones, lower part of back and epigastrium, succeeded by fever, &c. I was sent for, and saw him about 9 P. M. when he presented the following symptoms:—Pain in head, back, and epigastrium, the latter increased on pressure; pulse 140, and full; skin hot, particularly over abdomen; bowels constipated; great desire for cold drinks; tongue red and tremulous. Twelve cups to epigastrium, right and left hypochondrium, six to lower part of back; ol. ricin. ℥iss. to be succeeded in two hours by injections of oil, molasses, and mucilage, repeated every hour until bowels are freely acted on; cold affusion to head; cold barley water, and iced water for drink in small quantity at a time, but often as desired.

27*th*, 6¼ *A. M.* Passed a restless night; bowels freely acted on; pulse 120, but less full; pain of epigastrium, head and back, greatly relieved; nausea; urine red, and deposites a lateritious sediment; tongue furred and red at edges; the eyes injected; cups drew well, (about ℥xvi. of blood;) heat of abdomen and thirst but little varied. Repeat injection; tepid bath with cold affusion to head, and cold cloths afterwards constantly applied to epigastrium and head, otherwise continue treatment, (except in addition carb. sod. with tart. acid, in effervescence, occasionally repeated.) 12 *M.* Nausea rather increased; bowels freely opened; pain on pressing epigastrium; skin hot. A cold mucilage injection; three cups to epigastrium; continue treatment. 9 *P. M.* Pulse reduced to 100; sickness of stomach much relieved; yet head-ache; other symptoms but little changed. Repeat cold injection; warm bath with affusion of iced water to head; sponge body every hour or two with whiskey; continue treatment.

28*th*, 6 *A. M.* Again passed a very restless night; was much relieved after the affusion and bath, and calls for its repetition; bowels open; pulse 95; skin much reduced in temperature; thirst not so intense; other symptoms as noticed; head aches much less. Continue sponging; repeat injection and bath, with cold affusion; continue iced barley water and water; desires of being allowed to alternate his drink with orangeade. 9 *P. M.* Much prostrated; pulse 90; does not complain but of dullness of the head; slept about an hour during the day; urine (and tongue not so deeply red, and furred a little brown) less deep in colour; eyes slightly injected, and a little wayward in appearance; bowels open; temperature of skin improved, but no disposition to moisture; thirst increased; but little nausea. Repeat cold mucilage injection; warm bath with cold affusion; four

leeches behind each ear; continue sponging every two or three hours in the night; continue treatment.

29*th*, 6 *A. M.* Slept several hours last night, and felt entirely relieved; tongue is less brown and red, and evincing a disposition to clean; no uneasiness in head; bowels open and yellowish; pulse 85, but weak; temperature nearly natural; urine deposites scarcely any sediment; no injection of the eyes, and complains only of a little nausea; disposed to sleep this morning; thirst almost absent; desires the juice of an orange, which was allowed. Sod. pulv. in effervescence, when much nausea; a warm pediluvium about 9 A. M. Continue treatment. 9 *P. M.* Saw him during the day, but without difference in observation; nausea; pulse 80; bowels open; no pain on pressing epigastrium. Emplas. epispas. four inches square to epigastrium, to remain on until morning, unless nausea is sooner relieved; in this event, to remove it in four or five hours; mucilage injection; repeat pediluvium, with the addition of mustard; continue barley water.

30*th*. Epispastic soon relieved nausea; it was therefore removed, and dressed with cerate, after which he slept several hours; tongue cleaning; bowels open and discharge yellow; skin good; urine almost natural; pulse feeble; does not complain. Thin arrow root every hour or two; continue barley water.

From this time to September 4th, he continued very slowly to convalesce; he now desires to eat something else, and chicken water is allowed.

5*th*. Appetite and strength fast increasing; allow chicken soup in the day; black tea and toast for morning.

6*th*. Fast improving; desires and allowed an egg.

7*th*. Discharged well, with restrictions as to regimen.

Case XIX.—Mademoiselle ——, æt. 16, a creole of the city, but educated for the last seven or eight years in France, returned home in December last: temperament sanguine-lymphatic, ordinary stature, has menstruated for the last two years, was seized, August 24th, 1833, about 12 M. with rigors, pain in epigastrium and bones, particularly lower part of back, succeeded by head-ache, fever, &c.; her menses should have appeared the day previous, but no indication was presented. I was called at 6 P. M. when the following observations were made. Pulse 130 and full; pain of head, epigastrium, and lower part of back; the pain of epigastrium increased on pressure; skin hot, particularly over abdomen; tongue red; eyes injected a little; bowels constipated; constant desire for cold drinks. Forty leeches to epi-

gastrium; ol. ricin. ℥i., to be succeeded by an injection of ol. ricin., molasses, and mucilage in two hours, to be repeated every two hours until free discharges from intestines take place; a tepid hip-bath; cold barley water for diet and drink.

25th, 6 *A. M.* Passed a restless night, with but little sleep; pulse reduced to 115; bowels freely opened; pain in head, back, and epigastrium much relieved by the leeches, which drew well; urine now of a deep red, and deposites a lateritious sediment; tongue furred, white, and red at edges; temperature of skin diminished; eyes much less injected; thirst great. Repeat injection; tepid bath with cold affusion to head; sponge the body every hour or two with whiskey; ice allowed slowly to dissolve in mouth; continue treatment. 9 *P. M.* Saw her during the day, but no material variation; pulse now 110; desired repetition of the bath and affusion; head still aches, and slight pain of epigastrium; bowels freely evacuated, (five or six times in the day;) eyes scarcely injected; other symptoms as noticed. Ten leeches to epigastrium; a cool mucilage injection; repeat bath with affusion; continue treatment.

26th, 6 *A. M.* Passed a less uncomfortable night than the preceding, having slept two or three hours; only complains of dullness in the head; no pain in epigastrium, and skin much reduced in temperature; pulse 100; bowels open; tongue not so red at edges, but furred, slightly brownish; thirst not so great; urine of a paler red, and deposites not so abundant. Sixteen leeches to inside of thighs; continue treatment. 8 *P. M.* Feels entire relief of the head; complains of nausea since 12 M.; other symptoms as noticed, except pulse, 90. Carb. sod. with tart acid, in effervescence, every hour or two, while nausea continues; a warm pediluvium; continue treatment.

27th, 6¼ *A. M.* Passed a comfortable night; does not complain; pulse 80; skin good; thirst nearly absent; tongue showing a disposition to clean; is much prostrated and reduced; all appearances good; slight appearance of her catamenia. Thin arrow root every hour or two, in small quantity at a time; desires orangeade, which is allowed.

28th. Saw her several times yesterday; tongue cleaning; appetite increasing; bowels open and yellowish. Continue treatment.

29th. Slight nausea came on this morning, owing to an attempt to be elevated in bed, but now has nearly disappeared. Continue treatment.

30th. All nausea gone; desires to eat; allow chicken water. From this date to September 4th, she very gradually improved in strength. Now chicken soup, and a soft-boiled egg was allowed, the latter with black tea and toast in the morning.

6*th.* Is enabled to be up in her room. Discharged with restrictions.

Case XX.—The following case presents in the strongest light the truths of physiological medicine. Mr. J. N. H. a merchant, and particular friend of an intimate professional friend of mine, the latter of whom was taken ill and absent from the city. Mr. H. was of sanguine temperament; corpulent habit of body; first summer in the city; æt. about 33. He was affected with the ordinary premonitions of fever, in the night of September 7th, 1833. I was sent for, but the messenger procured another physician. On the night of the 12th of the same month, his friends came imploring me to visit him, as his condition, to use their expression, was hopeless. They had taken upon themselves the responsibility, and left the case, if I would see him, entirely under my guidance. This was at 11 P. M. When I saw him, I requested Dr. Hunt to be called, and, in conjunction, we would attend him, though with extreme reluctance, on account of public prejudice and public excitement. I learned that he had been treated, from the first commencement of the attack, with calomel, charcoal, and pulv. nit. potassæ, in combination, Seidlitz powders, porter, &c. The powders of calomel, &c. I found were still being administered to him, together with the above articles. At this time we noticed his condition as follows:—Convulsive hiccoughs; mind much disturbed, and wandering delirium; discharges of charcoal from the intestines every fifteen or twenty minutes; continually crying, and momentarily expects his dissolution; skin cool; fulness of abdomen; pulse small and tremulous; irritability of stomach; tongue red at edges; thirst considerable, and heat of stomach. Discontinue all previous treatment, and substitute the following. Epispas. ten inches square, to abdomen; cold barley and iced water for drink. In the morning, about 2 o'clock, we were aroused by there having been constant purging, since we left, of the above-described character. We prescribed syrup morphia, which fortunately checked the discharges, and calmed his great nervous excitability.

8*th*, 12 *M.* Slept, but disturbed an hour or two after our visit; rambling and delirium continue; epispastic drew well, produced strangury; complains of intense heat; hiccough continues, and acid eructations all morning, and one fit of black vomit about half an hour since, and is preserved on a napkin; the hiccoughs convulse him. Three cups to nape of neck, and administered ourselves a warm bath with iced affusion to head; ice in small pieces allowed slowly to dissolve in mouth; continue barley water. Solut. of hyd. bismuth, table-spoonful every hour or two, so long as eructation continues. 8 *P. M.* Condition but little changed; bowels have been opened

two or three times to-day, of same character as above; desires a repetition of his bath and affusion, which was most grateful to him; discharge of urine constantly by drops; no more black vomit. Eight leeches behind each ear; repeat bath and affusion; cool mucilage injection; continue treatment, with the addition of a tea-spoonful of thin arrow root occasionally.

9*th*, 6 *A. M.* Black discharges have occasionally taken place during the night from the intestines; hiccough continues, but less convulsing; delirium less; mind more calm; company has been ordered to be excluded ever since we have seen him; expresses his delight at the sensation of relief produced by the cold affusion. Cool mucilage injection; repeat bath and cold affusion; continue treatment. 8 *P. M.* Saw him several times during the day; getting more tranquil; black discharges less frequent and less deep colour; hiccough, but rather less frequent and much less convulsing; thirst not so intense; head not entirely relieved; urinates rather more freely. Repeat bath and affusion; continue treatment; occasionally the solution of bismuth.

10*th*, 6 *A. M.* Rested several hours last night; hiccough disappearing; sensation of heat fast vanishing; head as last reported Cool mucilage injection repeated; ice to head to be discontinued when uncomfortable to feelings; continue treatment.

11*th*, 6 *A. M.* Saw him several times yesterday, and the forepart of the last night; the ice to head was discontinued in two or three hours from its application; hiccough nearly ceased; all evidence of irritation absent; urinates well; is tranquil; discharges from bowels begin to assume a natural appearance, (yellowish.) Continue treatment; barley water and arrow root. 4 *P. M.* Hiccough gone; is cheerful; pulse good; no wandering; continue arrow root and barley water. 8 *P. M.* Company in our absence have intruded, and conversed with him on business transactions, which has produced symptoms threatening more than ever his dissolution; he has parching thirst; extremities cool; pulse quick and feeble; tongue red; delirium. Epispastic to nape of neck; a cool mucilage injection; continue treatment. 2 *A. M.* We were aroused from bed, and found him exceedingly restless, tossing in every direction in bed; such was the condition of his mind, that we feared to let him see us at that hour of the night, but unobserved by him we prescribed a cool mucilage injection; a warm pediluvium with mustard; and the epispastic to be removed and dressed, it had drawn well.

12*th*, 6 *A. M.* Got more calm after the above directions were executed, and dosed for an hour or two; is now more quiet;

delirium greatly abated, &c. pulse weak; extremities improved in temperature; thirst diminished greatly; discharges from intestines yellowish. Injection of weak beef tea every two or three hours; ice in mouth. 8 *P. M.* Saw him several times during the day; appearance has been fast improving; has become entirely calm; no wandering. Injection of beef tea repeated; a warm pediluvium with mustard; thin arrow root occasionally.

13*th*, 6 *A. M.* Rested and slept calmly several hours last night, is again cheerful and free from any trace of irritation. Allow a little jelly occasionally through the day. From this date to 19th his nourishment was gradually made more nutritious and increased, and is on last date enabled to be up in his room.

20*th*. Discharged well.

New Orleans, January, 1834.

ART. III. *Cases of Gastritis Superinduced.* By THOMAS J. CHARLTON, M. D. of Georgia.

THE physiological practice is entitled not only to the positive merit of curing disease, but also to the no less important negative one of preventing the use of injurious and empirical remedies. In truth, when we remark the delicate structure of the mucous membrane of the primæ viæ, and the essential nature of their normal condition to health and vitality, and at the same time reflect what improper and corrosive substances were lavishly placed in contact with it, we can scarcely refrain from asserting that in very many cases the disease was less dangerous than the physician. Most especially in the fevers of warm countries has this membrane suffered from injudicious treatment; the more intense its inflammation the more industriously was this added to by tonics and diffusible stimuli, and when by these means it approached disorganization, evincing itself by the black tongue, cold skin, and the debility, it was said to be reaching its ultimatum, and to be only remediable by the most profuse administration of the most powerful excitants. Is it wonderful that the supposed typhus state of fever, was common and fatal under a modus medendi, as rational as that which in Turkey loads the sufferer from small-pox with warm clothing, applies hot plasters to the eruption, and diets him on hot caviare?

The truth of the inferences which the able founders of the physio-

logical school have drawn, not only from the fallible, (and heretofore principal basis of medical systems,) ontology, but also from numerous and minute post mortem examinations, will eventually carry conviction to all minds sufficiently candid to reject error when convinced of it, however fatal such rejections may be to favourite theories. Broussais' works are already in the hands of nearly every intelligent physician of our country, and the plan of treatment inculcated in them is becoming established in chronic disease of the viscera, but those of an acute character are still frequently subjected to the "incendiary practice," and as long as this is the case, it is the duty of every medical practitioner to furnish such facts as may have occurred to him, leaving the inferences to the candour and discrimination of the profession. It is with this view that I offer for publication the following cases taken from many others of a similar character, and equally conclusive.

Francis Demere, nine years old, had been attacked with the usual symptoms of climate fever, five days before I saw him; being at some distance from medical aid, he was treated by his parents. On the second day a cathartic was given, which increased the nausea and vomiting, which had existed from the onset; another was given on the third day, with the same effect, and from the continuance of this symptom he was supposed to be suffering from a redundancy of bile, and that an emetic was indicated; one grain of tartar emetic was administered, which increased the distress and nausea, but did not cause much vomiting; all his symptoms became worse, and when I saw him, (12th August,) his pulse was small, and 125 a minute; his skin very cold; complexion palled; and the tongue brown; I recognised gastritis, and ordered blisters to his extremities, and small quantities of gum water, acidulated with orange juice for drink; the tongue in six hours became cleaner, the skin warmer, and the pulse fuller and slower; but at the accession of the cold stage of the next paroxysm, (the type was double tertian,) the debility appeared so urgent that I was induced to give a tea-spoonful of wine every fifteen minutes; this stimulant evidently increased the gastritis, the tongue became dark again, the skin cold, and at the same time there was intense suffering from internal heat, and an urgent demand for cold drinks. I determined to resume and adhere to the plan of treatment first adopted; at each accession of the paroxysms I endeavoured to sustain the system by the application of mustard plasters to the abdomen and extremities, and during the paroxysm I gave the gum Arabic water and lemonade. I was gratified by seeing the evidences of gastritis slowly subside, and by a gradual resumption of food, the patient acquired his usual health.

The next case I have selected is that of a negro. Catherine, twenty years old, had been attacked with pleurisy seven days before I saw her; she had been bled, but not sufficiently, and had taken a cathartic and two emetics of the sulphas zinci; when I saw her, gastritis had been superinduced, her pulse was quick and small, there was great distress and oppression in the epigastrium, the tongue was dark, and she was comatose when not roused. The cough was not troublesome, the expectoration was copious, and the respiratory murmur as distinct as usual, there was no evidence of effusion in the thorax. Believing her to be suffering more from mal-practice than from the original disease, I directed my efforts to the purpose of subduing the gastric irritation which I attribute to the emetics. I cupped her over the epigastrium, and gave her small quantities of flaxseed mucilage cold frequently. The disordered intelligence soon improved, and the tongue became clean; but having indulged in the use of food at night, all her symptoms became worse, and her disease appeared to be approaching a fatal termination. I directed blisters to the legs and abdomen, purgative enemata and gum Arabic water. The termination of her disease was long doubtful, but she eventually recovered by a persistence in the use of mucilages and a rigid diet.

Bryan County, Georgia, January 15th, 1834.

ART. IV. *Thoughts on the Bilious Remittent, commonly called Congestive Fever.* By THEODORE BLAND DUDLEY, of Alexandria, Louisiana.

SOME one has said quaintly, but forcibly, that "words are the counters of wise men, but money of fools." It is much to be lamented, that in medicine, as well as in religion and politics, there should be so much of fanaticism prevail; words or names are substituted for things, and reasoning in a specious but delusive garb, often misleads even those who are most proud of assenting to nothing that is not sanctioned by its dictates. Why else is it, that some favourite dogma in our science, from the days of PARACELSUS to the present time, always has its day? SANGRADO with his warm water; BROWN with brandy and opium; RUSH with his lancet; to a host of minor luminaries, with their drachms of calomel, which they unceasingly pour down without *scruple.*

These reflections have grown out of the present prevailing notion,

that calomel, and calomel alone, should be our sole reliance in the treatment of the various grades of remittent fever of southern climates. It is a Samson indeed, and its strength may be applied to useful and salutary purposes; but that does not warrant, in the eye of dispassionate and philosophical reasoning, the tearing down the temple, to the utter destruction of the edifice and its inmates.

The mode of reasoning of the advocates of this Herculean system is simply this, that in a certain form of fever commonly called congestive, there is an engorged state of that complex and important organ called the liver, whose office is the secretion of bile, so essential to the healthy action of the animal economy—that calomel having a more decided specific action on that organ than any other known agent, it must be given ad infinitum, till the liver is brought into subjection, and a healthy performance of its functions. This is plausible reasoning, and would be valid enough, if the fact be admitted, that it will generally produce the desired result without any concomitant evils; and it were equally well established, (as they assume,) that there are no other agents, which alone, and especially as adjunct to the mercurial system moderately enforced, will produce the desired result without its concomitant evils.

The theory that the mercurial fever is essential to subduing that already existing, is, I think, toto cœlo, fallacious. It has arisen from the fact, that in particular grades of morbid excitement in this congestive fever, when salivation is induced, the patient becomes convalescent; it is inferred from a very common, but fallacious mode of reasoning, (the placing effect for cause, and vice versa,) that salivation is essential to cure. But I believe that in every instance, where this state of things results, the same effect would have ensued from a much more simple and harmless procedure, the evacuant and sedative course; convalescence is more speedy, and the horrible consequences that occur when salivation cannot be induced, viz. mercurial gangrene often, and chronic mercurial disease generally would be obviated. I have witnessed in numerous cases the most shocking and deplorable consequences from this pernicious abuse of mercurials, the patient dying by inches, an object of the most intense and agonizing sympathy to the friends, and of loathing and horror to the spectator, of hopeless wretchedness.

The autumnal remittent, commonly called congestive fever, as it usually prevails in the southern part of the United States, and especially on Red River, where the writer of this article has seen and marked its character, commonly commences with the usual precursors of fever—languor; lassitude; indisposition to action; loss of appe-

tite; chill, not always distinctly sensible to the patient, but with evident shrinking of the extremities, followed by febrile paroxysm, more or less sensibly developed; yellow discoloration of the skin, and especially of the conjunctive coat of the eye. The patient for several days is able to go about, but finally confined by aggravation of all symptoms. Excessive irritability of stomach now comes on, accompanied by torpor of the bowels, which are with difficulty moved by ordinary cathartics. During the cold stage, which often continues from four to six hours, the irritability of stomach is greatly aggravated, and is indeed one of the most distressing and uncontrollable symptoms of the disease. The pulse is feeble and thready, not much increased in frequency, and greatly diminished in volume. The tongue is furred, and of various colours, from light brown to a dark inky hue; generally moist.

If this state of things is not met with promptitude and energy, there is a rapid decline of all the vital powers, and the patient dies on the seventh, ninth, or eleventh days. The disease invariably assumes the tertian type, the paroxysms being more violent on the alternate days; there is however a daily chill, which on the odd, or critical days, is greatly aggravated.

The indications of cure are obviously to equalize action, to abstract from organs most labouring under a suffocated state of excitement, and to invite action to those parts where there is an evident deficiency. With this view during the remissions, it is desirable to produce a prompt action on the bowels by cathartics, and of this class of medicines, I have found calomel combined with rhubarb alone, and sometimes with aloes, as in the following prescriptions, the most efficient. ℞. Merc. mit. gr. x. vel xij.; pulv. rhæi, ℈j. Or the following:—℞. Merc. mit., pulv. rhæi, pulv. aloes socot. āā. gr. x. M. ft. pill. vel bolus. In from three to six hours, should there be no decided effect on the bowels, give an active dose of castor oil, and should this fail, cathartic enemata should be freely administered, till the desired effect be produced. During the hot stage, the free use of saline diaphoretics has the happiest effects in counteracting the unequal distribution of the excitement, tending to an evident mitigation of all the violent symptoms; as soon as diaphoresis manifests itself, with this view, whenever the hot stage is decidedly developed, unaccompanied by irritability of stomach and vomiting, the following prescription will prove highly beneficial. ℞. Antimon. tart. gr. j.; pulv. nitri. ℥ss.; aq. font. ℥vi. M. ft. mist. A tablespoonful to be given every hour till free perspiration supervene. Should the inflammatory action run high, and the above prescription

fail to produce the desired effect, the lancet should be called into its aid. But should there be great irritability of stomach, as is often the case, the following prescription should be substituted. R. Carb. potassæ, gr. x.; aq. font. ℥j.; succ. limon. q. s. ad ejus saturationem—quâque horâ adhibenda donec supervenirit diaphoresis.

Should this fail to allay the irritability and vomiting, apply a large blistering plaster over the region of the liver and stomach, and recur again to the purgative enemata, either of which remedies alone has the happiest effects in arresting vomiting, and relieving the sensation of anxiety and oppression, which are in most cases horribly severe.

In this state of things the patient often complains of intense burning sensations, and anxiously beseeches the use of the fan to produce ventilation; when the parts so complained of are greatly below the natural temperature; when the extremities are cold, and the general temperature of the body is below the healthy standard.

During the existence of this stage of the disease, so distressing to the patient, (for this is the period of greatest anxiety and suffering,) I have found the semicuprium followed by frictions, with a warm infusion of Cayenne pepper in brandy, to act most powerfully in producing revulsion: sometimes sinapisms or blistering are necessary to keep up a permanent impression: often hot bricks or bladders, or bottles filled with hot water, will have the desired effect.

There is always a marked alleviation of all the urgent symptoms of this fever as soon as free alvine evacuations are produced, which exhibit in colour and consistence almost every variety of shade. Sometimes in milder cases simple bilious discharges are produced, and such cases are soon brought to a favourable crisis, by keeping a constant eye to the free evacuation of the bowels during the remissions, and the use of the saline diaphoretics above-mentioned during the febrile paroxysms; but in other cases of aggravated forms of the disease, this desideratum is with difficulty obtained. There seems to be so great an accumulation of morbid secretions producing torpor of the bowels, that the most active cathartics appear feeble and inefficient; in this state the exhibition of active cathartic enemata as adjuvants is attended with the happiest and most decided good effects.

The writer has witnessed cases where the degree of exhaustion was so great that the patients had become pulseless, and all the ordinary precursors of approaching dissolution were rapidly developing themselves. When the exhibition of strong purgative enemata has been resorted to, bringing away copious acrid, vitiated secretions, there has been a return of pulse, and an increased strength and fulness after

each discharge, and this in cases too, where a timid and cautious practitioner would dread exhaustion from purgation.

Whenever local congestions exist, cupping and leeching are highly salutary—the pulse becoming slower and fuller, even after a very small abstraction of blood has taken place. As soon as this happy result occurs, viz. a more generally diffused state of the excitement, a remission of all the urgent symptoms immediately follows, and convalescence is speedily established, which requires little further to complete the cure than a due attention to the state of the bowels, and a strict regard to diet.

ART. V. *An Account of a New Instrument for Operating in Cases of Fistula in Ano.* By THOMAS D. MUTTER, M. D. one of the Physicians to the Philadelphia Dispensary, &c.

FROM the time of HIPPOCRATES down to the present day, no disease has excited more attention, and been studied with more success, than the one termed, (though very incorrectly in most cases,) fistula in ano: its causes, its phenomena, the indications to be fulfilled in its management, have all been clearly and positively demonstrated; it would therefore be worse than useless for us to enter, at this late period, into an elaborate history of the disease. It will be necessary, however, to notice the usual divisions of fistulæ, in order to render apparent the design and modus operandi of the instrument about to be described. When a discharge by incision of the contents of an abscess situated in the neighbourhood of the rectum has been too long delayed, the matter will of its own accord force for itself an opening, either through the external parts in the neighbourhood of the anus, or through the parietes of the rectum. Occasionally it happens, that we have both an internal and external orifice, existing at one and the same time. These different conditions have given rise to a division of anal fistulæ into three species—1st, those in which the matter escapes by one or more openings through the integuments alone, and which are called "blind external fistulæ;" 2d, those in which the matter empties into the cavity of the rectum, and no external opening exists, which are called "blind internal;" and 3d, those in which an opening exists both in the gut and skin, which are termed "complete fistulæ." Notwithstanding the assertion of MM.

Foubert and Ribes, and to which opinion Sabatier inclines, "that no such thing as a blind external fistulæ can exist, and that in *all cases* there is an opening into the gut," both experience and reason lead us to contend, that so far from this state of things never occurring, it is the most common variety of fistula in ano; and this I believe is the opinion of the most experienced surgeons of the present day. The difficulty with which a sinuous ulcer, when located in loose cellular tissue, heals, has long been fully appreciated, and numerous methods of effecting this end have been introduced into practice; caustics, stimulating applications, incision, extirpation, &c. have all been tried at different periods, and with varying success. The father of medicine long ago taught this fact, and to him are we indebted for the very measures made use of at the present day in the treatment of fistulæ, though modified it is true, both as regards the cases to which they are applied, and the instruments employed. The indication to be observed in the treatment of fistula in ano, (a disease belonging to the class of "sinuous ulcers situated in loose cellular tissue,") is the division of the barrier existing between the sinus and the cavity of the gut, and formed chiefly by the walls of the latter, by which means the two cavities will be thrown into one, and an open sore, instead of a hollow sinuous one, established.

The ancients were fully aware of the importance of this indication, and their remedies for the most part were directed to obtain its fulfilment. In some cases, however, they attempted to heal the sinus by the introduction of caustic substances into its cavity. It may not prove uninteresting or inapposite to pass in review some of their different plans of treatment, and first of *Caustics.* Hippocrates formally recommends the application of caustic substances to the internal surface of a fistulous canal. He applied them by means of a linen tent, (of sufficient length to pass from one orifice of the fistula to the other,) which was first rolled in cerate, and then dusted over with the substance to be used. It was introduced into the tract of the fistula by means of a probe, to which it was attached by a thread; this was introduced through the external orifice and brought out through the anus. A suppository of horn was then inserted into the rectum. On the sixth day the caustic tent was removed, and a simple one introduced in its place; the horn suppository was likewise removed, and replaced by one of alum. This practice was founded upon the supposition, that the parietes of every fistulous canal were necessarily callous, an opinion which it is almost needless to say, is erroneous. The plan, however, seems to have never ac-

quired much reputation, and had nearly fallen into oblivion, when it was revived by Dionis, in France. Since his time, though frequently spoken of by surgical writers, it has never been introduced for obvious reasons into general practice.

Cautery.—Passing a bistoury heated to a white heat along the tract of the fistula, has also been recommended; this method of course never obtained much reputation. The rationale of its operation is obvious.

Ligature.—The treatment of fistula by the ligature is no less ancient in its origin than that by caustic. To the Coan sage we are also indebted for this practice, though Celsus, among the ancients, may be considered as having given the most lucid and useful description of its application and modus operandi. Almost every writer since his time has taken especial notice of this practice, some recommending it as the most certain, least painful, and least dangerous of all methods hitherto made use of; others again condemning it as tedious, painful, and uncertain. Desault, among the more modern authorities, directs it to be employed in all cases where the fistula extends beyond the reach of the finger, and where from the position of the neighbouring vessels they must unavoidably be wounded in any operation performed with a cutting instrument. His practice was to pass a leaden wire through the fistula, and then bring it out at the anus. The ends of the wire were then twisted together, and the loop gradually tightened every day. By this means, ulceration and absorption of the barrier between the gut and sinus would in time be effected, and the two cavities converted into one. The ligature is sometimes made use of at the present day in similar cases, though for the most part it has been entirely abandoned.

Extirpation.—It is as yet a mooted point to whom the credit of this operation is due. Pott gives it to Guy de Chauliac; Bertrandi to Ætius, who wrote about the end of the fifteenth century. Celsus also mentions it. However this may be, the modern surgeon never thinks of employing it, except perhaps in those cases in which several fistulæ communicate with each other, the parietes of which are exceedingly callous or scirrhous. In all others it should be rejected, as it is frequently followed by hæmorrhage, fever, profuse suppuration, diarrhœa, and contraction of the orifice of the anus from loss of substance. It consists in the extirpation of a slip or narrow portion of the barrier between the gut and sinus, by means of two parallel incisions, and its object is to prevent the too rapid healing of the wound.

Incision.—The most experienced surgeons of the present era have

for a long time abandoned these different methods, (with the exception of the ligature occasionally used,) and confine themselves to the operation, in which the tissues situated between the sinus and cavity of the rectum, are merely divided or incised. It is to Hippocrates again, that we are indebted for this operation, which, although restricted by him to those cases in which there existed no communication between the fistula and the cavity of the gut, has been applied by modern surgeons to almost all conditions of the disease. Various instruments and plans of operation have been invented to effect this end with the greatest facility to the operator, and with the least pain to the patient. The French method differs materially from the English and American. In the French operation, a kind of director, called a gorget, which is usually made of ebony wood, and intended to be introduced into the rectum, with its concavity turned towards the fistula, is made use of. After this has been properly placed, a steel director, inflexible, slightly pointed, and without a cul-de-sac, is passed through the fistula until its point comes in contact with the wooden gorget. A long, narrow, sharp-pointed, straight bistoury, is now introduced along the groove of the steel director, till its point meets the groove of the ebony gorget, by cutting upon which all the parts are divided which lie between the internal opening of the fistula and the anus. The English operation is performed with merely the forefinger of the left hand introduced into the rectum, and a knife, which is passed through the fistula until it arrives at the finger, in ano. The two, after being properly balanced, are then withdrawn together, dividing as they pass along the barrier between the rectum and sinus. This operation is superior to the French, inasmuch as it is more simple, and more easily performed. There exists, notwithstanding, a difficulty to be overcome of no trifling importance in some cases, and which is occasionally a source of embarrassment to the surgeon, when the latter operation is performed: it is the introduction of the knife into the cavity of the rectum when no communication between it and the sinus exists. The ingenuity of different surgeons has led to the introduction into practice of several variously-contrived knives, which have been invented with the design of effecting this indication, and at the same time guarding the finger of the surgeon from all danger of being wounded. For the most part, all of those which have come under our observation are faulty in some respect or other. Before, however, entering upon an analysis of their merits, it may be as well to state what indications an instrument intended for operating in fistula in ano, should be capable of fulfilling. In the first place it should be so constructed that it may be used in *all cases* of fistula,

whether complete or incomplete. 2d. Its blade should be shielded so as not to cut the tract of the fistula as it is introduced; by which means the patient is saved a great deal of pain. 3d. Its point should be so formed, that the finger of the operator, during the division of the parts, will be in no danger of being wounded by it. 4th. It should be sufficiently small to admit of easy introduction into fistula of the usual size. 5th. It should be *simple and cheap.* Let us see if the instruments usually employed fulfil all of these indications.

Probe-pointed bistoury.—To the common probe-pointed bistoury, the instrument generally recommended as the most simple and easily used, it may be objected, in the first place, that in cases where it is necessary to make an opening into the rectum, it will not answer from the bluntness of its point; for it will be found almost impossible to make it penetrate the gut, provided the latter be in a healthy condition, notwithstanding the assertion of a celebrated author, "that the smallest degree of force will thrust the point of the knife through," to the contrary. 2d. That it, (as well as any other instrument, the edge of which is not protected by a sheath,) will give the patient unnecessary pain, by cutting the whole tract of the fistula, as it is passed on to the gut. Hence it is seen, that it does not answer the two most important indications in the operation, though it does the three others.

Sharp-pointed bistoury.—Should the sharp-pointed bistoury, which has been recommended whenever it becomes necessary to make an opening into the gut, be used, the surgeon's finger will most inevitably suffer, and in some cases severely, from the sharp point of the knife necessarily pressing forcibly upon it. It has been recommended to shield the finger, either with a common thimble, or a piece of sheet lead; should either be used, it has a bungling appearance, and does not always answer the end intended. The same objections then, which were made to the probe-pointed bistoury, are applicable here, with the additional one of its always wounding the operator's finger more or less severely.

Physick's bistoury.—Some years ago Dr. Physick, fully aware of the imperfections which existed in the instruments usually employed in fistula in ano, had one constructed, decidedly the most ingenious and useful that had hitherto been proposed. It consists in a sharp-pointed bistoury, enclosed in a moveable sheath or guard, so arranged that when the knife is furnished with its guard, it resembles a probe, and may be passed down to the bottom of the sinus, without causing any more pain than would be produced by the introduction of a common probe. When it has reached the gut, by pressing slightly upon the

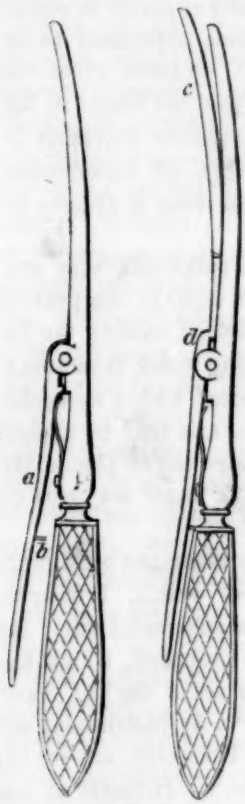
guard, which is attached in a peculiar manner, the latter may be removed, whilst the naked blade remains in the sinus. When a hole is to be made through the gut, the guard must be first disengaged. This instrument combines, to a certain extent, the advantages of the blunt and sharp-pointed bistouries, and is infinitely superior to either when considered alone. There are however some objections to be made to it; in the first place, the sharpness of its point when the guard is removed, will almost to a certainty subject the finger of the surgeon to a severe wound; 2d, as the blade gradually increases in width towards the handle, where it is quite large, its introduction will cause pain, unless the fistula is much larger than it usually is; 3d, it is complicated and expensive.

Bistoury of Cruikshank.—The bistoury of Cruikshank may probably be considered as the best instrument met with at the present day in practice, though it is liable to the objection of cutting the fistula as it passes through its tract, and also of being wider than necessary; it is moreover expensive. It is constructed with a moveable stilet, which passes along the side of the blade, and may be pushed forward or retracted at pleasure; its point is intended to pierce the gut, and then to be withdrawn, that the surgeon's finger may rest on the blunt extremity of the knife.

This completes the list of instruments usually made use of in practice; many others have been invented, none of which, I believe, have acquired any reputation, or at best only an ephemeral one. No instrument, however, it is seen, has ever been proposed, which answers all the indications stated above. Let us see if the one about to be described comes up to our definition of "a fit instrument for fistula in ano." To Frere Come, or rather to Bienaise, are we indebted for the principle of the "bistoire caché." Hitherto it has been confined chiefly, if not exclusively, to instruments intended for the operation of lithotomy; at all events, I believe it has never been applied to an instrument for operating in fistula in ano. Struck with the advantages that an instrument contrived upon this plan, modified however as regards the arrangement of the blade, would possess over any other as yet invented, with the assistance of Mr. Rorer, instrument-maker, I fashioned the one represented in the annexed cut. Like the lithotome caché, it consists in a handle and blade part, the latter four inches in length, and one and a half lines in diameter, slightly curved, and excavated so to form a sheath for a knife of its own length. Instead of terminating in a closed beak, or cul-de-sac, like the lithotome, it is opened at its extremity, to allow the knife to be pushed forward like a stilet. The handle of the

knife being so arranged, that it operates as a lever, the knife, as in the lithotome, may be made to start out from its sheath, by depressing its handle. By means of a mortice cut in the shank of the knife, through which the rivet attaching the knife to its sheath passes, the former may be shoved forward, or retracted at pleasure, like a stilet in its canula, by merely acting upon its handle. The point of the knife should be sharp, and its width throughout sufficiently narrow to admit of its being completely concealed by its sheath, to avoid cutting the fistula during the introduction of the instrument. To prevent the knife from slipping forward, when the lever is depressed, which it will do, after the instrument has been used several times, a small steel pin proceeds from the handle of the *knife*, and fits into a small, round hole in the handle of the *sheath*. The object of the knife being made moveable in its sheath is, that in cases where there exists no opening in the gut, one may be made by merely pushing upon its handle. The principle upon which the instrument operates, is obvious at once, and its great utility in cases of blind external fistula must be equally apparent. It is used in the following manner:—The patient having been properly prepared for the operation by previous treatment, is to be placed as in the usual operation for fistula in ano—upon his hands and knees, with the light falling upon the buttocks. The surgeon then passes the fore-finger of his left hand, well oiled, into the rectum of the patient. The instrument also well oiled, and closed as in No. 1, (see cut,) is then passed through the external orifice, and along the tract of the fistula, until it arrives at the orifice, (provided one exists,) in the gut; its blunt extremity is then received upon the finger in ano, and the two properly balanced; the lever is then depressed, the knife starts out, and the finger and instrument being drawn out together, all the parts intermediate to the inner orifice of the fistula

No. 1. *No.* 2.



No. 1. Represents the instrument closed, as when it is about to be introduced into the fistula. *b*. The steel pin, which prevents the knife from slipping forward when the lever is depressed. *a*. The lever in the position it occupies when not depressed.

No. 2. Represents the mechanism of the instrument. The lever depressed. *c*. The knife thrown out of its sheath by the depression of the lever; its point projecting beyond the beak, as when it is used as a stilet. *d*. A part of the mortice in the shank of the knife, which permits it to be pushed forward, or retracted at pleasure.

and the anus, are divided, and the two cavities converted into one. When however no opening exists in the gut, the operation differs somewhat from the one just described. The finger and instrument are introduced precisely as in the other case, but instead of their coming into immediate contact at their extremities, they will be separated from each other by the wall of the rectum. An opening of course becomes necessary, and may be made in the following manner:—Having determined by the touch the spot through which it is to be made, the surgeon slips his finger from the point of the beak, a little to one side of it, whilst with the thumb of the hand holding the instrument, he thrusts forward the knife, by acting upon its handle; its point is thus made to penetrate the coats of the gut, and an orifice large enough to permit the instrument to pass into the cavity of the rectum is established. The stilet is then to be retracted, the point of the finger and the blunt beak of the instrument balanced upon each other; the lever depressed, and the operation finished as in the first instance. The wound is to be dressed as in the ordinary operation for fistula in ano, and the after treatment is precisely the same. It will be seen at once, that this instrument fulfils to the letter the different indications in the operation for anal fistulæ. It may be used in *all cases!* its introduction gives the patient no more pain than would be produced by the passing of a common probe! The finger of the operator is perfectly secure from all injury! it is so small, that it may be introduced into almost any fistula without difficulty, and it is simple and cheap. It possesses moreover the advantage of being applicable to many other operations. It can be used in all cases of fistulas, in whatever part of the body they may occur, in phymosis, in fissure of the anus, in abscess of the fauces, in hernia, &c.

ART. VI. *A case of Hepatic Abscess, in which Tapping was Performed before Adhesion of the Liver to the Side had occurred; and the Appearances after Death.* By W. E. HORNER, M. D. Professor of Anatomy in the University of Pennsylvania.

ROBERT MILES, tax-collector, a respectable and valuable citizen, aged fifty-four, a short, stoutly-built man, whose habit of body had been impaired by previous attacks of sickness occurring at distant intervals, and by hæmorrhoids; was seized about the 1st of December, 1832, with symptoms of dysentery, which disappeared under treat-

ment by Dr. Chapman and myself in sixteen days. They seemed to be connected with an elastic tumour of an inch in diameter in the linea alba of the epigastric region; this tumour was taken for a hernia of the stomach or colon, and having diminished much as he convalesced, got entirely well in a few weeks afterwards.

On the 25th day of May, 1833, he suffered from an attack of colic followed by diarrhœa, and the bowels continued loose and irritable for some time.

July 18th, being in the country for the recovery of his health, he was seized with severe pain in the epigastric and right hypochondriac regions, attended with fever, and came under the professional treatment of Dr. VANDYKE, to whom I am indebted for the following statement:—

"DEAR SIR,

"On the 19th of the month of July, 1833, I was requested to visit Mr. Miles at the residence of his son-in-law, Capt. Robinson. The general appearance of the patient evinced debility and emaciation of body. The complexion pale and sallow, pulse frequent and feeble, coldness of the hands and feet, indicating a disturbed balance of circulation. He complained of an obtuse pain in the right hypochondriac region, sense of fulness after eating, but could lie on either side without any sensation of weight or dragging, from which I inferred that no morbid adhesions then existed; had no cough; appetite diminished, and digestion imperfectly performed; slight and irregular chills were felt through the day, and a febrile paroxysm occurred every evening, terminating in profuse perspiration. Tongue slightly furred; sleep disturbed; biliary secretion vitiated; stools frequent, exhibiting a frothy, yeast-like consistence, of varying and unnatural colour. An examination of the body discovered an enlarged and indurated state of the liver. The nervous organism was not materially affected, and the mental energies and spirits were unimpaired.

"A careful consideration of these symptoms led me to the conclusion, that the patient at that time laboured under an hepatic obstruction and chronic enlargement of the liver. The indications of treatment deduced from these morbid phenomena, were the reduction of the periodical febrile excitement, and the removal if possible of the hepatic obstruction and induration. These were attempted by external frictions and irritative applications over the region of the liver, and by mercurial remedies, &c. He was ordered three grains of calomel at bed-time, with a table-spoonful of the expressed juice of taraxacum on the following morning, to be taken every second night, and to use daily frictions of a wash, impregnated with resinous fumes upon the right hypochondrium, with mustard applications. During the febrile paroxysm he was directed to take forty drops of sp. nit. dulc. every two hours; and the occasional use of mustard sinapisms to the extremities. Diet abstemious, light, and of easy digestion. The pursuance of this treatment, slightly varied according to circumstances to the 13th of July, was attended with some advantage. The febrile paroxysm and night sweats ceased; the appetite was somewhat improved; the strength increased; the evacuations were more natural in appearance, but still

too frequent; and the enlargement of the liver remained unchanged. A cretaceous julep was now ordered in occasional doses as the state of the bowels required, and a seton recommended.

"It was at this date proposed to Mr. Miles by some of his friends to try a trip to the sea-shore, as his strength was improved. To this proposal, upon being consulted I consented, desiring him to continue the remedies during his visit, and to return immediately should it not agree with him.

"I did not see him again until about the 20th of August, when I received a visit from him at my house for the purpose of obtaining further advice. He seemed evidently benefited in appearance and strength. A continuance of the remedies was advised; substituting for the calomel, grs. iij. of mass. hydrarg. and the extr. taraxac. for the fresh juice. The seton was again recommended.

"With sentiments of the highest respect,

"I am, your friend,

"F. A. VANDYKE."

"*Hawthorn Cottage, Oct. 14th,* 1833."

August 25th.—Mr. Miles had a renewal of his attack of hepatitis; a considerable tumefaction of the right side was apparent, attended with extreme pain. The ordinary depletory remedies were resorted to by Dr. Thomas Harris, who, in consequence of my being from town, was kind enough to take charge of the patient. He was leeched on the side freely; a blister plaster was then applied, and the blistered surface kept open; it being dressed occasionally with morphia to diminish the intensity of the pain which shot down from the liver to the right iliac region. The administration of blue mass with morphia was also instituted; the mass being given to the amount of two grains daily.

On the 2d of September I resumed the charge of the patient, and continued with but little interruption the treatment which had been instituted by Dr. Harris. The descent of the liver below the right margin of the thorax, amounted at that time to three or four inches, and it formed a very conspicuous indurated swelling. About the twentieth day of the month, fluctuation was perceived, and became each day afterwards more distinct. Occasionally excruciating paroxysms of pain came on, which were generally relieved by an opiate. The patient in the meantime evidently declined in health, and became subject to exhausting perspirations. Under these circumstances we looked anxiously for the spontaneous evacuation of the abscess through some of the common routes for such matter, but being disappointed in this, the expediency of operating through the side was suggested, as it was clear that death must come in a short time without relief. The great objection to the operation was however ignorance of the fact, whether an adhesion had formed between the liver and the anterior side of the abdomen, and if this were not the case,

the unavoidable risk of opening the cavity of the peritoneum, and the probability of some of the matter of the abscess running into it and producing inflammation.

The case being in this unpromising condition in every view of it which could be taken; a choice of evils only was left, and with the consent of the family, and the advice and assistance of Dr. Harris, the operation was undertaken October 1st. An incision was first of all made horizontally on a line with the anterior end of the eighth rib on the right side, a little in front of its cartilage, and through the side of the abdomen, which brought the liver into view; the latter was seen to rise and fall with the diaphragm in respiration; moreover, a knife handle was introduced between the surface of the liver and of the contiguous part of the abdomen; these two facts made clear the thing apprehended, to wit, want of adhesion. In this dilemma I determined to stitch the liver to the side, which was accomplished with a large crooked needle, armed with a ligature of kid skin, and of bulk sufficient to fill up the hole made by the needle. One stitch was made in this way parallel with the upper margin of the incision at the distance of four lines from it, and another in the same manner below. The liver being thus fixed closely to the side, a trochar and canula were plunged into the abscess, and five gills of purulent matter were immediately discharged to the great relief of the patient; the matter continued to flow during the night, so that three or four more gills were discharged. The operation being ended, a bandage was put around the abdomen so as to keep its viscera as still as possible. The canula was left in for fifty-four hours, and then a piece of a flexible catheter was substituted. The abscess discharging all this time small quantities of pus and serum mixed.

On the second day the bowels became tympanitic, and there was hiccup, with cholicky pains. On the third day there was a manifest declension of strength, and it became evident that the previous exhaustion of the patient must render the operation nugatory. The symptoms of debility increased, and the patient died on the 5th inst. No sign of peritonitis followed this operation.

In twenty-two hours after death an examination was made. A recent adhesion between the liver and side had occurred immediately around the puncture of the trochar, and which along with the stitches had prevented any pus from getting into the cavity of the peritoneum. The latter membrane was entirely sound, and had no appearance of being irritated by the operation. The cavity of the abscess was collapsed very much, and contained shreds of coagulating lymph mixed with pus, amounting in all to about one gill; its parietes were lined

by a membrane. The right lobe of the liver being the seat of it, the anterior half was gone, but it appeared to be rather by pressure and absorption than by dissolution, as no remains of the liver were seen in the discharges. There was no preternatural adhesion of the liver to the parietes of the abdomen, excepting what was made by the operation. The left half of the stomach was destitute of mucous coat, it having been dissolved completely, so as to exhibit the cellular coat naked. Six inches of the beginning of the colon were studded with ulcers having red, injected, and elevated edges. The small intestines were sound.

Though life was not saved by this operation, evidently owing to the exhaustion of the patient at the time of its performance; I yet consider it as illustrating the fact, that hepatic abscess may be managed by opening it, even when adhesion to the side has not occurred; provided the liver be secured in the way described, or by an equivalent process; and after a deliberate review of the case, I only regret that I did not resort to this treatment when the abscess first fluctuated.

ART. VII. *Case in which Sand was voided by the Mouth, Rectum, Urethra, Nose, Ear, Side, and Umbilicus, and attended by various other Anomalous Symptoms.* By C. TICKNOR, M. D. of New York.

MISS LUCY PARSONS, of Egremont, Berkshire county, Massachusetts, when about eleven years of age received an injury, by the fall of a barrel across her loins, which was followed by exquisite pain, and an almost total loss of the power of locomotion. The pain after a time subsided, and the ability to walk gradually returned, though partial paralysis of the lower extremities, accompanied with severe pain, would almost invariably recur after much exercise. This state continued till about seven years after the receipt of the injury, when some portion of the surface was attacked with an erysipelatous inflammation, which, by metastasis, fixed itself upon the abdominal viscera. The patient now suffered excruciating pains, particularly of the right lumbar region, together with all the various symptoms of diseased stomach and bowels, was unable to walk, and mostly confined to her bed, till I saw her in the autumn of 1831, more than twenty years after the attack of erysipelas.

My brother first saw the patient in consultation with her attend-

ing physician: he found her labouring under a profuse diarrhœa, which threatened a speedy termination to all her sufferings; food would pass in *ten minutes*, to all appearances precisely as it was taken into the stomach, without smell or change of colour. At this time a few grains of calomel put a stop to the diarrhœa, and the patient remained one hundred and nine days without any fecal evacuation *per rectum*. The most active cathartics had no other effect than to cause pain and irritation of the bowels, and a vomiting of their contents. An injection thrown into the rectum would be vomited in a few minutes, having the same appearance as when administered, and free from any admixture of feces. During this period of one hundred and nine days the patient experienced a regular vomiting each day of the food, properly digested, which she had taken the preceding twenty-four hours. About this time there was something of a peculiar appearance in the matter vomited, which, on washing, proved to be *sand;* and on examination it was found that sand was also discharged with the *urine*. The bowels resumed their office, and it now became the turn of the bladder to have its contents expelled by vomiting; the patient experienced a strong desire, without the ability, to pass the urine by the urethra, and on trying to introduce a catheter, the passage was found occupied by a hard substance, which rendered the operation impossible. The urine was now vomited for several days, though it occasionally passed *per rectum*, mingled with sand, till a quantity of sand stones, or lumps of concrete sand, were discharged from the urethra, when the urine again flowed through its proper channel.

The pain continued unceasing in the right side; a small abscess formed, which, being left to itself, opened and discharged, with a small quantity of pus, several lumps of sand; and in the efforts at vomiting, feces escaped through the same opening.

June 8th, 1832.—No fecal evacuation from stomach or bowels in *forty days*; has taken a great deal of cathartic medicine; vomited her urine; vomited injections in fifteen minutes after being administered, without the least appearance of any feces; appetite pretty good, though she takes but little food; tongue of an *inky* blackness, except the edges, which are *red;* complaining of excessive pain in right side and stomach; says she can feel lumps of sand moving inside; sand passes through the external opening in the side, mixed with blood, and sometimes feces; has had spasms of the muscles about the throat and jaws.

13*th*. Pain very great; jaws spasmodically closed; mouth filled with lumps of sand, several pieces passed out at the nose; saw her eat some bread and milk, and in a very few minutes it passed out at

the opening in the side; tried to introduce a probe into the orifice but could not succeed; could feel the sand in the side.

14*th.* Received a note from the patient's brother, saying that his sister this morning passed by stool, *at one sitting, forty-four lumps of sand.*

25*th.* The lumps of sand discharged on the 14th, vary from the size of the fore-finger to the first joint to that of a small pea; no fecal evacuation from stomach or bowels since last date; for the first time during her illness, she has since last visit vomited purulent matter, and voided it by stool.

July 19*th.*—Received the following account from the patient's sister of her state since last visit. On the 6th inst. her jaws became spasmodically closed; bowels for three succeeding days regular, since then no discharge per rectum; regular vomiting once a day of fecal matter, which is quite fluid, and escapes between the teeth; 8th, right ear began to bleed; 12th, discharged a watery fluid resembling urine *with sand.*

30*th.* An abscess opened just above the symphysis pubis, and discharged a small quantity of pus, afterwards *urine mixed with sand,* which continued for a week. Present symptoms—appetite pretty good; takes liquids, which she sucks between her teeth; jaws being yet firmly closed; vomits feces every day, the fluid part escapes between the teeth, and the more solid part is again swallowed; has lumps of sand in her mouth, which have been there *eleven days;* a dose of tartar emetic caused a little relaxation, and the mouth was emptied; at this visit I saw her vomit her urine, one gill, perfectly transparent, as if just passed by the urethra; saw a tea-spoonful of fluid discharged from the ear with sand, and a lump of sand from the nose; sleeps little; suffers exquisite pain; another abscess seems to be forming in the right side; more emaciated than I have seen her at any period of her illness.

August 1*st.*—Jaws yet closed; vomits, or passes by stool every few minutes, a whey-like fluid; retains *very little* food; since last visit voided by stool at once a table-spoonful of sand with a tea-cupful of pus, and soon afterwards there was discharged in the same way a membrane-like substance, of the size of a crown-piece, containing a number of fine, delicate hairs; there is voided now sand and urine by the mouth, rectum, urethra, nose, ear, side, and umbilicus! Treatment—Nit. argent. grs. x., op. xv., ft. pil. xx., one every fourth hour; foment abdomen, side, and throat, with decoction of cicuta.

13*th.* Symptoms of same character, though much mitigated in violence. Continue the same treatment.

September 1*st.*—No diarrhœa; some vomiting; pain of left side; no discharge of sand since last date; deaf with right ear; vomits urine occasionally; for two weeks has been troubled with spasms resembling epilepsy, has twenty or more in a day, is warned of their approach by pain in the epigastric region; left leg strongly flexed upon the thigh, heel drawn up and lying upon the glutei muscles, and has been so for twelve days; appetite good, but most of the food is rejected soon after eating. Take the following pill every fourth hour—Ext. hyosciami, grs. iij., castor, grs. ij., nit. argenti, gr. i.; laud. and ext. cicuta between the pills in quantities sufficient to procure sleep or quiet; foment spine, side, and epigastrium, with decoct. cicuta.

10*th.*—No spasms since last date till to-day; omitted the pills yesterday, and to-day the spasms returned; no natural evacuation from bowels or bladder since 20th July; contents of both are vomited; appetite tolerable; has ridden out several times since last visit; left leg continues flexed. Treatment, the same.

October, 1833.—Have not seen the patient for more than a year: her sister gives the following account of her condition during that interval. Her bowels soon became quite regular, and so continued for some time, then relapsed into their former obstinately costive state, when their contents have been vomited; appetite has been generally good; left leg during the whole time has continued flexed, and attempts to extend it have invariably caused frightful spasms; has ridden out frequently, done a good deal of needle work, and may be said to enjoy comparatively good health. I ought to add, that during the whole illness of this patient her catamenial evacuations have been generally regular, though at times rather profuse.

A lump of sand discharged from the bowels, which Dr. Torrey and Dr. C. A. Lee, of this city, had the kindness to analyze for me, proved to consist of silex and lime, and a few *short hairs;* the former making much the greater proportion. Professor Averill, of Schenectady, did me the same favour, with the same result.

Most of the facts related in the above case, besides being witnessed by my brother, Dr. L. Ticknor, of Salisbury, Conn. and myself, can be vouched for by the following gentlemen. Dr. Bolton, of Egremont, Dr. Kellogy, of Sheffield, Dr. Wheeler, of Great Barrington, Professor Averill, of Union College, Drs. Cleaveland and Flallenbeck, and Mr. Oliver Whittlesey, of this city.

The interesting features of this case will readily suggest themselves to the mind of every reader. It furnishes an extraordinary example of the amount of disease the system can sustain when nature is playing her wildest freaks.

Plate I. Vol. 14.

Fig. 1.

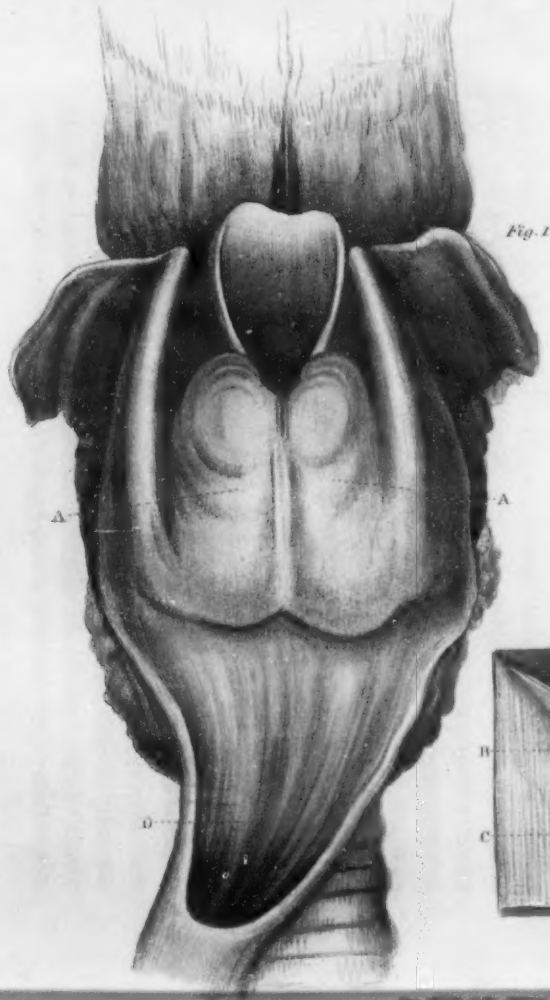


Fig. 3.

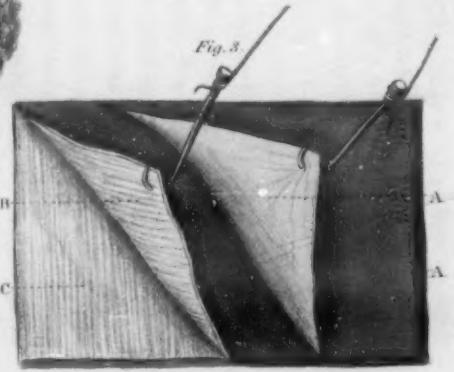
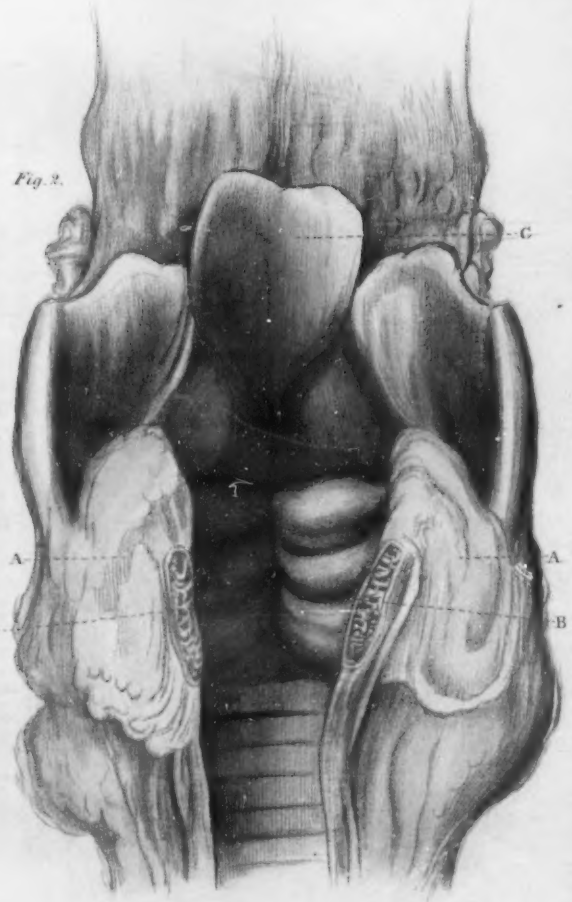


Fig. 2.



Dr Jackson's Case.

In regard to the imposition which the patient practised, or at least *might* have practised, I may state that she has sustained a character for genuine piety, and to have lived with her two maiden sisters who have had the sole care of her for more than twenty years; they had a small estate, which, with frugality, would support them all, and there ca be no reason why she or her sisters should wish to deceive. I have hesitated about publishing the case, but I believe it a duty I owe to my profession not to withhold the facts, however they may be accounted for, or however little they may be believed. I have thought best to give the facts and the facts only—the patient is still living about fifteen miles from where my brother is practising, and he may yet detect her in her imposition if she is not put upon the look out by publishing speculations prematurely. Can these phenomena be accounted for without calling the aid of imposition?

No. 369, *Hudson street, New York, Dec.* 31*st*, 1833.

ART. VIII. *Case of Purpura Hæmorrhagica.* By SAMUEL JACKSON, M. D. Assistant to the Professor of the Institutes and Practice of Medicine in the University of Pennsylvania.

PURPURA is a disease that occasionally presents itself to the observation of practitioners, though not of frequent occurrence. Its pathology is involved in great obscurity. No hypothesis yet suggested can be adopted, as cases are to be met with that contradict in their facts the presumed solutions of the pathological problem.

The disease belongs apparently to the hæmorrhages, but the proximate cause of the hæmorrhage has as yet resisted all scrutiny that is satisfactory. It assumes two forms—the simple, when a drop of blood exudes beneath the cuticle, the serous or fibrous membranes, or in the parenchyma of the organs. These are intermingled with vibices and ecchymoses. In the second form, along with the preceding circumstances, there is effusion of blood from some portions of the mucous membranes, and occasionally from the skin. The first affection is generally, if not always curable; the last is often fatal. Both occur in individuals of dissimilar constitutions, temperaments, habits and conditions of life.

Phœbe M'Gonagle, aged forty-seven, had been an inmate of the Alms-house for the last two years, most of which time she had

passed in women's medical ward, and in bed; her complaint being chronic rheumatism, for which only a palliative treatment had been pursued. Her gums had been in a diseased state for a year, but never discharged blood. To the best of her knowledge, she was never salivated. During most of her stay in the house, she has been on good diet, with a portion of wine daily. About the third week in December, 1833, she commenced to discharge blood from the mouth, and passed in twenty-four hours nearly, if not entirely, a half a pint. She complained of pain in the chest and nausea, cough, and apparently expectoration of blood. Ecchymosis followed the application of cups to the chest, and the following day purple spots appeared on the arms. The pulse was feeble and frequent. A gargle of sulph. zinci, and a strong infusion of pulv. gallæ were directed, and to procure sleep, which the patient could not before obtain, opium was given at bed-time. The patient was greatly depressed in spirits, and was getting worse. At this time I saw the patient, and directed, R. Tartrat. ferri, ʒj., aqua, ℥iv. Half a table-spoonful four times a day. Also, R. Nitro-muriatic acid, ʒj., aqua, ℥iv., honey, ℥i. Tea-spoonful every hour. The stomach could not retain the remedies, and they were discontinued. I then substituted, as a gargle, Dipple's animal oil, gtt. ij., aqua, ℥iv. During the last twelve hours the patient has discharged nearly a pint of blood from the mouth, and a small quantity from the vagina. The blood coagulates about the gums. A nutritious diet is allowed her, but she has little relish for any thing.

January 2d, 1834.—Spots of purpura on every portion of the body; large patches of effused blood in the mucous membrane of the mouth; the body was sponged frequently with the following:—R. Chlor. sodæ, ʒj., aqua, ℥vj.

3*d*. Not much amendment. Patient complains of intense pain in the epigastrium. Discharges of blood from the bowels; pulse very feeble. A blister was applied for one hour to the epigastrium, and ol. terebinth. gtt. iij. administered every hour.

4*th*. She is very feeble. Skin sallow, and covered with purpura and ecchymosed spots. Her stomach revolts against the turpentine, and indeed every thing excepting wine whey. Directed R. Cal. grs. ij., pulv. rhei, grs. vj. every four hours, and an injection of salts and senna. The hæmorrhage from the bowels the succeeding day was nearly suspended; on the 5th it returned. The best of diet, as essence of beef, oysters, and eggs was allowed her; brandy, with tinct. rhatany were exhibited to sustain her forces, and arrest the hæmor-

rhage. But every thing proved fruitless, and at 3 P. M. of January 7th, she expired, the blood continuing to the last to issue from the gums, and to be discharged from the bowels and vagina.

Post mortem appearances, January, 9th, 1834.—Emaciation not very great; skin generally sallow; purple and scarlet spots upon the skin of the eyelids, about the nostrils, around the mouth, upon the upper and lower extremities and body; these spots varied in size from a pin's point to that of a sixpence. In some places, especially upon the anterior surface of the thighs, there were ecchymosed spaces and streaks of discoloration, two or three inches in extent. Several of the small spots were covered with dried coagulated blood, that had oozed from the pores. Thorax; adhesions strong between the pleura pulmonalis and costalis; left lung exhibited the vesicular emphysema, otherwise this lung was healthy. The apex of the right lung filled with immature tubercles; one inch from this there was a mass, of the size of a hazel-nut, of tubercies in the same condition; also at the root of this lung there were half a dozen small tubercles, which were blackish externally, white and hardened internally; in a portion of the upper lobe was also vesicular emphysema, while the lower lobe was free from it. Heart; some few purpura were upon the inner surface of the pericardium, also upon the fat upon the posterior portion of the heart. The muscular part of the right auricle was infiltrated with blood of a scarlet hue; the remaining portions of the heart natural; lining membrane natural aspect. A purpuric spot of a bright red colour was on the inside of the epiglottis, another extended from one arytenoid cartilage to the other; three inches below this there was a patch of a deep bluish colour; the mucous membrane of the œsophagus was upwards of four times its natural thickness, and its density throughout its extent augmented; in colour it was of a deep port-wine red, approaching to black; it was also covered with an adventitious membrane, which was in a state of incipient putrefaction. The surrounding cellular membrane was injected with blood, which at first was black, but upon exposure, it changed into a florid colour, proving the blood to be susceptible of atmospheric influence. A superabundance of fat was found in the greater omentum. Stomach; its villous coat was covered with a gelatinous, greenish mucus; beneath this it was injected with blood of a bright hue; consistency natural. The duodenum and upper portion of the bowels were nearly filled with thick yellow mucus; the lower part of the ileum contained it of a dark brownish-red. A thick, tenacious, tarry-like substance was found in the lower part of the colon and in the rectum. The cœcum after washing showed its inner surface

much discoloured; four inches from the caput coli there were many dark enlarged mucous glands, varying from one-eighth to one-half an inch in length, and covered with coagulable lymph; this patch of tumours was four inches in extent; then succeeded a large ragged ulcer, with an indurated base; below this the colon was discoloured with livid spots for five inches. The tumours again commenced, and continued for eighteen inches. Lower down, the mucous membrane was merely discoloured with a darkish hue; several ulcerations were found about the ileo-colic valves. Kidneys; the right one externally resembled the spleen in appearance; its structure was injected. Left kidney; its pelvis and calices filled with dark soft coagula; the ureter enlarged, and the upper portion highly injected. Pancreas very hard, and contained caseous matter. Uterus; its membrane very white; the upper cavity contained albuminous fluid; several purpura around the neck and upon the vulva. Cranium; several purpura beneath the scalp. Brain; considerable effusion of blood beneath the dura mater; blood partly coagulated; congestion of florid blood along the course of the longitudinal sinus. Structure of the brain softened.

Observations.—For the above account of the case and autopsy I am indebted to Dr. Porter, resident physician to the Almshouse. The patient of the above case was of broken down constitution, having long suffered under disease, and it might be presumed that this was the predisposing cause of the purpura. It however occurs in individuals in the enjoyment of robust and vigorous constitutions, and the affection cannot therefore be regarded, in a positive manner, as proceeding from that cause.

So far as the general properties of the blood are indicative of a sound condition of that fluid, it manifested a healthy state. It coagulated in the mouth and on the gums, as rapidly as it was effused. It was found coagulated in the body. Exposed to the air it rapidly assumed the scarlet hue, showing the preservation of its natural relations to the air. It is not then probable that the blood was materially changed in its condition, and the cause of purpura cannot be looked for in a diseased state of this fluid.

In examining attentively the spots of purpura and the ecchymosis by dividing through the tissues, I could not discover any appearance of a coagulum, indicating an effusion or extravasation of the blood. It appeared much more to resemble a circumscribed collection of blood in the minute capillaries or areolar texture. Can the disease be connected with the capillary circulation?

In this patient the general circulation was exceedingly feeble—the pulse scarcely perceptible. An inordinate force of the action of the heart was not in this case the cause of the hæmorrhage and purpuric

maculæ, though such a conjecture has been made in explanation of their production.

The œsophagus and alimentary canal exhibited the evidences of prolonged disease. The œsophagus was more especially the subject of pathological derangement. Its mucous membrane was hypertrophied, indurated, and nearly black. The cellular tissue below it in the same state. Its surface was lined with an ancient exudation of lymph, which had fallen into a state of putrid, semifluid sanies. This condition of the œsophagus will account for the difficulty the patient experienced in taking aliment and the remedies prescribed. It was impossible to sustain her forces.

This case, though it exhibits chronic structural disorder sufficient to account for the general loss of health, the exhaustion and feebleness of the patient, prior to the attack of purpura, throws no light on the specific pathology of that disease.

Art. IX. *Cerebral Affections of Children.* By W. W. Gerhard, M. D. (Second part.)

In the first part of this essay I published the details of ten cases of the cerebral affections of children; it was my original intention to have enlarged the series by annexing such cases as I had subsequently collected at the Children's Hospital of Paris. It would I find be incompatible with the limits of the journal to give so great an extension to a single article; I shall therefore confine myself to the cases already detailed, as the proofs of the deductions at which I may arrive; these observations, in common with others which I have not published, will form the materials of the second part of the essay.

The anatomical lesions constitute the distinctive characters of the three classes into which I divided the cerebral affections of children. The first class included such cases as offered an evident lesion of the brain, or its membranes, without the presence of tuberculous or other accidental tissue; this class is by no means so distinct as I had at first thought; the autopsies prove that the appearances in all the ten cases either possessed the evident characters of tuberculous matter, or approached them so nearly as to render it impossible to indicate the precise line of demarcation. The cases were selected from such as were least clearly dependent upon the deposit of tuberculous matter in the brain or its meninges, and therefore lead us to suspect a

fact which will be presently more fully developed; that is, the close connexion, if not identity, of one form of cerebral disease with the tuberculous affections. The classification which was legitimately assumed for the convenience of study, should therefore be modified, and the first division will include all evident alterations of the brain or its membranes, whether these alterations be connected with the presence of tubercles or tuberculous granulations, or without evidence of the existence of any accidental tissue. The second class includes cases in which the presence of one of the accidental tissues, other than the tuberculous, was detected; it includes but two cases, one in which a cerebriform or encephaloid tumour was found immediately beneath the junction of the optic nerves, and another which presented a fungoid tumour in the posterior part of one of the lateral ventricles.* The third class will not be modified, but will still include such cases as presented no evidence of alteration of the brain or the meninges.

The most important fact to which this series of observations has led, is the proof of the connexion of the cases included in the first class with the tuberculous affections. It was long since remarked, that many children who had died of a cerebral disease, were of a scrofulous temperament, but it was impossible either to confirm this remark, or to point out the cases to which it should be limited, without the aid of pathological anatomy. The obscurity which exists in the application of the terms acute hydrocephalus, or according to M. Guersent, meningitis, has led to the extreme diversity of opinion amongst physicians as to the mortality and possible cure of this disease; with the greater perfection of diagnosis a more exact appreciation of therapeutic means becomes practicable, and the singular discrepancy of opinion which prevails in the treatment of hydrocephalus may be readily explained.

The tables which follow, contain in one column the name, age, and sex of the children; under the same head the organs which contain either tubercles† or grayish semi-transparent granulations are noticed. The lesions of the pia mater are mentioned in the second column, which characterizes the affection. Another column contains the quantity of liquid found in the ventricles, and the fourth, the state of the cerebral substance. The tabular form will greatly facilitate the deductions.

* This specimen I presented to the *Société Anatomique* of Paris; a notice of it will be found in the first or second bulletin for 1834. (Archives Générales de Médécine.)

† The term tubercle is used in the generally received signification, that is, a rounded or amorphous substance, yellowish, hard, and with a dull, uniform surface if cut.

	Pia Mater.	*Ventricles.*	*Cerebral Substance.*
1. *Rebours*, male, æt. 6. Tubercles in bronchial glands and spleen.	Infiltration of yellowish, concrete, tough substance into the pia mater around the optic nerves.	Three ounces of limpid serosity.	Firm.
2. *Deucar*, male, æt. 11. Scrofulous abscesses on limbs; bronchial glands cretaceous.	Yellowish substance in the fissures of Sylvius and around the optic nerves. Slight yellow infiltration on the convex surface.	Two or three tenspoonfuls of limpid serum.	Softening of central portions. Injection moderate.
3. ——, male, æt. 15. Tubercles in pleuræ and bronchial glands; gray semi-transparent granulations through both lungs.	Yellow opaque matter around the optic nerves, and in the fissure of Sylvius.	Two ounces of clear serosity.	Firm; natural colour.
4. *Erlemont*, female, æt. 5. Tubercles in left lung and bronchial glands. Caries of foot.	Slight thickening around the optic nerves, and hard semi-transparent granulations in each fissure of Sylvius.	Three drachms of limpid serum.	Septum lucidum, and fornix soft. In general firm, and moderately injected.
5. *Jeannette*, female, æt. 2. Bronchial glands tuberculous.	Gray granulations on convex surface of the arachnoid. Concrete whitish substance in both fissures of Sylvius and around optic nerves, containing some hard whitish granulations.	An ounce to two ounces of milky serosity.	Firm; not injected.
6. *Bellavoine*, male, æt. 6. Tubercles and granulations in both lungs, liver, and mesenteric glands. Bronchial glands?	Opacity in fissures of Sylvius, with gray semi-transparent granulations.		Firm; not injected.
7. *Trehlue*, male, æt. 6. Opaque tubercles in each lung; cavity in the right. Bronchial glands tuberculous. Peritoneum, liver, and spleen tuberculous.	Tubercle in the left hemisphere. Greenish tough substance with granulations in fissures, and at the base of the brain generally. Other granulations on upper part of right hemisphere.	An ounce of limpid serum.	Substance of brain firm, except around a tubercle.
8. *Margotin*, female, æt. 8. Tubercles and cavity in right lung; granultions in left; bronchial glands tuberculous; ulcerations in small intestine.	Yellowish-white granulations in left fissure of Sylvius.	One to two drachms of serosity.	Not softened.
9. *Landras*, female, æt. 6. Bronchial glands contain cretaceous matter. Tubercle in cerebellum.	Milky aspect of the arachnoid at the base. No granulations.	Three ounces of limpid serosity.	Firm; pale.
10. *Fortin*, male, æt. 4. Tuberculous granulations in right pleura.	Opacity and thickening around the base of the optic nerves. Yellow opaque patch on the upper part of the cerebellum.	Greatly distended, perhaps six ounces of limpid serosity.	Not injected; slight softening of the central parts.
11. *Mayen*, male, æt. 13. Gangrenous cavities in the right lung. No tubercles formed.	Yellowish hard granulations upon the convex surface of the hemispheres and at the base, along the vessels.	Not distended.	Firm; a little injected.

	Pia Mater.	*Ventricles.*	*Cerebral substance.*
12. *Camier*, male, æt. 6.	Thickening of the arachnoid at the base, around the fissure of Sylvius.	Much distended by serosity.	Central portion softened.
13. *Vernet*, female, æt. 14. Both lungs filled with very numerous gray granulations. Tubercles in bronchial glands, kidney, and small intestine.	Yellowish substance on each side of the median line, same substance at the base around the optic nerves, and in the fissures of Sylvius. Hard granulations upon the whole convex surface of the hemispheres.	Contain a drachm of troubled serosity.	Central parts and walls of the ventricles in general diffluent.
14. *Poupart*, female, æt. 6. Cavities and crude tubercles in left lung. In right, numerous tubercles and granulations. Bronchial and mesenterie glands tuberculous.	Tubercles on the upper part of right hemisphere, with gray granulations on each side of the median line. Fissures of Sylvius filled with concrete matter containing gray granulations.	An ounce of troubled serosity.	Softening around the tubercles.
15. *Dehaut*, female, æt. 4. Lungs contain tubercles. Bronchial and mesenterie glands tuberculous.	Tuberculous infiltration and gray granulations on upper part of left hemisphere. Fissures of Sylvius filled with granulations.		Softening around the tubercles, and of the posterior part of left hemisphere.
16. *Pachon*, female, æt. 5. Caverns, tubercles, and gray granulations in both lungs. Bronchial and mesenterie glands, spleen tuberculous.	Large tubercle in the inferior part of right hemisphere. Tubercles in the pia mater, and granulations in the fissures of Sylvius.	A drachm of serosity.	Softened in the fissures.
17. *Blondel*, male, æt. 2. Cavern in lower lobe of right lung; tubercles and gray granulations in both lungs. Spleen, bronchial and mesenteric glands tuberculous.	Two tubercles attached to the cerebellum. Thickening and numerous granulations in the pia mater of the base.	Two drachms of serosity.	Softened at the centre and around the tubercles.
18. *Terard*, male, æt. 7. Lungs and pleuræ filled with numerous tubercles. Ganglia tuberculous.	Tuberculous masses on each side of the median line. Granulations in the fissures of Sylvius.	Two drachms of serosity.	Parietes of ventricles and cortical substance in contact with the tubercles much softened.
19. *Sances*, female, æt. 6. Very numerous granulations throughout both lungs. Bronchial glands tuberculous.	Granulations and patches of yellow substance on both sides of median line beneath the arachnoid. Base of the brain including fissures of Sylvius covered by yellowish substance.	Two ounces of serosity in ventricles.	Not injected; central parts softened.
20. *Courtray*, female, æt. 7. Lungs contain tubercles and granulations. Bronchial and mesenterie glands tuberculous.	Yellow substance covering the central parts of the base, and the fissures of Sylvius; whitish hard granulations in this substance. Tubercle on the cerebellum.	Two to three ounces of serosity.	Not softened; nor injected.
21. *Delouche*, female, æt. 5. Lungs full of miliary tubercles. Mesenteric and bronchial glands tuberculous.	Tubercles on the summit of both hemispheres. Tubercles and granulations at the base of the brain.	Two or three ounces of serosity.	Central parts softened.
22. *Boudoux*, female, æt. 5. Cavity in right; tubercles in both. Bronchial glands tuberculous.	Granulations numerous on the convex surface. Yellow substance filled with the same granulations at the base.	Two ounces.	Cortical substance at the base flaccid, but without change of colour.

	Pia Mater.	*Ventricles.*	*Cerebral Substance.*
23. (16. *Stumne,*) female, æt. 4. Tubercles in pleuræ. Cavities and numerous tubercles in lungs. Ulceration of larynx. Mesenteric and bronchial glands tuberculous.	Tuberculous mass on the right hemisphere, extending from the summit to the base.	An ounce of limpid serosity.	Walls of both ventricles much softened.
24. ——, female, æt. 7. Tubercles in pleuræ; tubercles and cavities in lungs. Bronchial glands very tuberculous.	Semi-transparent granulations at the base, in the midst of a tenacious transparent substance which also contains a few opaque miliary tubercles.	An ounce of troubled serosity.	Parietes of ventricles much softened, including the central parts.
25. *Colas,* female, æt. 4. Tubercles in lungs and pleuræ. Ganglia, spleen, and liver tuberculous	Yellow substance in the fissures of Sylvius.	An ounce of limpid serosity.	Firm.
26. *Noireau,* male, æt. 4. Numerous granulations in lungs, pleuræ, and peritoneum.	Layer of yellow substance interspersed with granulations, covering the whole base of the brain.	Three ounces of serosity.	Cortical substance of the fissures of Sylvius softened and injected.
27. *Benard,* male, æt. 7. Numerous tubercles in both lungs and pleuræ. Tubercles in ganglia, spleen, peritoneum, and kidneys.	Granulations and miliary tubercles in the fissures of Sylvius and cerebellum, and to a less degree on the convex surface of the brain.	Five ounces of transparent serosity.	Firm; not injected.
28. *Kiffer,* male, æt. 4. Tubercles in left lung, bronchial and mesenteric glands.	Granulations on the convex surface of the hemispheres and in the fissures of Sylvius, without concrete substance. Tubercle in the cerebellum.	Two ounces of reddish serum.	Cerebral substance a little injected, but firm.
29. *Lamiral,* female, æt. 7. Viscera not noted.	Opaque miliary tubercles on the convex surface of the brain. Granulations in the fissures, and tubercles of the size of peas adhering to the pia mater.	Half an ounce of serosity.	Central parts not softened.
30. *Pincon,* female, æt. 10. Bronchial glands and spleen tuberculous, other viscera not noted.	Opaque hard substance around the optic nerves. Granulations on the right hemisphere and the cerebellum.	An ounce of serum.	Firm and pale.

I am indebted to my friend M. Rufz for the last six cases of the thirty which are analyzed in the preceding table. I am in possession of two other cases which form part of the same series; one is relative to a child three years old, and the other to one seven years of age; both girls. In each case the yellow opaque substance so often mentioned was found at the base of the brain, with semi-opaque granulations adhering to the arachnoid; in both subjects tubercles existed in several viscera, and in the elder, the arachnoid, pleura and peritoneum were nearly covered by numerous gray granulations. The whole series includes, therefore, thirty-two observations; that is, all the cases which had been regarded as examples of the affection known under the names of hydrocephalus acutus and meningitis, and which had offered on dissection a lesion of the cerebral organs or membranes.

It will be seen that all the subjects, with the exception of Nos. 11 and 12, presented tubercles in other organs than the brain. In case 11, gangrenous cavities were found in the lungs, but no acute tubercles were discovered, so that the origin of these cavities is of course doubtful; but the existence of perfectly characterized miliary tubercles in the membranes of the brain proves that the case belongs to the same class as the other observations. I was not present at the examination of the case No. 12; I was indebted for a note of the autopsy to a friend who omitted to examine all the organs with care.

In every case analyzed, there was evidence of the existence of tubercles in one or more organs; the subjects were therefore all tuberculous, that is, offered the circumstances necessary for the formation of tuberculous matter; this disposition to the general production of tubercles occurred in no other disease which I observed, than that now investigated, and phthisis or evident tuberculization. The substance formed beneath the arachnoid was in many cases evidently tuberculous, consisting of round, hard, semi-transparent or opaque yellowish bodies, which presented the usual characters of tuberculous matter; in other cases these granulations were interspersed throughout by a homogeneous, semi-transparent, gelatinous matter. This disposition of the tuberculous granulations, closely resembles the appearance of a lung infiltrated with tuberculous matter, through which miliary tubercles are disseminated. Another form of the morbid production is, that of a yellow tough substance of consistence and aspect intermediary between fibrine and tuberculous matter, or not unlike concrete pus. It is difficult to ascertain the precise nature of this substance; in several of the subjects I have lately examined, I subjected small portions to microscopical examination, and distinctly recognised two distinct parts, that is, semi-transparent granular bodies in the midst of an amorphous matter. Whether the same distinction of the two substances exists in all cases, is yet to be decided.

The table indicates the quantity and characters of the serosity found in the ventricles; it is evident that the effusion of serum is variable in quantity, and far from constituting the necessary character of the disease.

The cerebral substance was sometimes softened, at others it retained a perfectly natural aspect; the rigidity of the muscles was by no means confined to the subject which presented the softening of the brain. Case No. 3 is an example in point.

The question whether this affection is of an inflammatory nature, excited formerly great interest. M. Guersent was of opinion that it

consisted in an inflammation of the membranes. M. Senn adopted this view. M. Charpentier, who had also observed it at the Children's Hospital of Paris, called it a meningo-cephalitis. I have reason to believe that M. Guersent, to whom the coïncidence of tubercles with this disease had been shown, has now modified his former opinions. The cases which I have detailed, induce me to regard this form of cerebral affections as closely analogous to the deposition of tuberculous matter in other organs. M. Rufz, who prosecuted his examinations in a separate service of the hospital, and examined with care all the organs of the children who died while under his observation during the last nine or ten months of the past year, (1833,) agrees with me in regarding the weight of evidence as decidedly in favour of the tuberculous nature of the affection. Those who may think the evidence sufficiently strong, may adopt this inference without agitating the question of the inflammatory or non-inflammatory nature of the disease. It will then in fact be placed upon the same footing as the formation of tubercles in other parts of the body, and such as are still disposed to regard tuberculous matter as one of the products of inflammation in the one case will be at liberty to extend the theory to the other. The existence of tubercles does not explain the cause of death; they constitute simply the anatomical character of the disease; the morbid actions which precede the anatomical lesions are probably not always in direct proportion to their effects. Thus, the case of Mayen presented only a few round tuberculous granulations in the pia mater, yet we can draw from it no direct inference as to the intensity of the disease during life.

Next to the development of tuberculous matter, the anatomical phenomenon of greatest interest is the lesion of the mucous membrane of the stomach. Of the ten cases detailed, six presented an unequivocal alteration of this organ.* Of the other cases not detailed, about four-fifths offered a lesion of the stomach. The alteration of the mucous coat was sometimes limited to a simple thinning, more rarely it was thickened, in other cases it was mamillated. In some subjects the thinning of the membrane was very great, but it was nearly limited to the great tuberosity and disposed by bands, generally longitudinal, but sometimes united by transverse lines; these bands contrast by their bluish tint with the surrounding membrane. The thinness in

* We mean by unequivocal lesion an alteration of thickness or consistence, or other apparent change of structure; livid punctuated redness may also be regarded as a lesion, but the lighter degrees of injection, or the general redness of imbibition, constitute doubtful evidence of inflammation.

bands of the mucous membrane seems an undoubted lesion; the gelatinous softening may be an appearance produced after death, at least the question is still doubtful. The thinning of the mucous membrane is not peculiar to this affection; it occurs in many other diseases, especially the tuberculous; but some years since, when the physiological doctrine engrossed so much attention, the alteration of the stomach was looked upon as a proof of the gastric origin of meningitis.

Symptoms.—One of the first and most constant symptoms was *vomiting;* of the ten cases which I published in the preceding number of the journal, eight offered this symptom at the commencement, or during the first days of the affection. In two it was stated not to have occurred, but the parents of one of the children were possessed of too little intelligence to render the information received at all certain. Of four cases, (not published,) in which some details could be obtained respecting the same symptom, three were accompanied by vomiting. The inference is clear, that vomiting forms one of the first symptoms in a large majority of patients affected with this form of disease.

Cephalalgia.—This symptom existed in all the cases in which sufficient data could be obtained to ascertain its presence or absence. The cephalalgia usually continued until succeeded by delirium or coma.

Constipation.—Immediately after the vomiting and cephalalgia, the dejections either cease or become extremely rare. Case No. 2 offers the only apparent exception. Stools may sometimes be produced by the action of a cathartic, but with difficulty; they were not followed by a notable diminution of the symptoms.

Delirium.—A noisy, violent delirium is very rare in this affection. Nos. 1 and 3 of the cases published are the only instances of it which I have witnessed, The low muttering delirium is frequent; I have myself ascertained its existence some days previously to the termination of the affection, in nearly one-half of the cases which were admitted. The absence of muttering delirium in a number of cases could not be satisfactorily established, in consequence of the necessity of relying upon the reports of the attendants of the sick. Moans, or low plaintive cries of the kind first noticed by M. Coindet of Geneva, are frequent in the affection when the coma becomes very profound; they are however by no means characteristic of the disease. The movement of the lower jaw, *(machonnement,)* exists in a large number of cases; it is usually observed at the same time with the low plaintive cries.

Convulsive movements of one or more muscles were detected in nearly one-half of the cases, (five in twelve,) which were examined

on this point. The absence of this symptom cannot be affirmed with entire accuracy, unless the child had been much more closely observed than is practicable in a large hospital. The spasmodic movements occurred in the earlier or second stages of the disease.

Lesions of the organs of movement.—These were an increased and permanent contraction of the muscles; or secondly, perfect or imperfect paralysis. Of the ten cases published, but one, No. 7, offered no evidence of permanent contraction of the muscles of either the face or limbs. Of the other cases, Nos. 1, 5, and 10, presented but slight traces of rigidity; in all of these cases the quantity of serosity in the ventricles was remarkably great. Of the cases not published, two only offered no distinctly marked contraction of the muscles; in these the same abundance of serum in the ventricles was observed. The great secretion of serum seems therefore to coïncide with the absence of the muscular contraction observed in the large majority of cases. The degree of anormal contraction is very various, in some patients it is observed in the slight distortion of the features without paralysis, in others there is a little rigidity of the muscles of the neck, and in the more marked cases, strong contraction of the muscles, always more distinct in the upper than in the lower extremities, and generally more evident on one side of the body than on the other, without being strictly limited to either.

The rigidity of the muscles is most easily discovered at the elbow, but care must be taken not to mistake the voluntary resistance of the muscles caused by the annoyance of the child for the permanent involuntary stiffness. At first this distinction is hardly to be made, except by a careful comparison of both sides of the body. In some cases the contraction of the muscles is so marked that the limbs are in a state of permanent flexion, which can only be overcome by a strong effort.

Paralysis existed in none of the ten cases published, but the power of voluntary motion was greatly *diminished* in all. Perfect paralysis did not occur unless immediately before death. *The sensibility* at first is almost invariably augmented, the increased susceptibility to impressions is not confined to the muscular system, the senses are more acute, bright light and loud sounds are both evidently painful; the same increased susceptibility is betrayed by an aversion to questions and impatience of the least disturbance. The sensibility invariably diminished as the symptoms became more intense, and in some cases, (three and five for example,) it was extremely obtuse. The loss of sensibility coïncides with the rigidity, unless one side of the body be in a state of nearly perfect paralysis.

Senses.—The pupils were generally dilated; thus, of the ten cases, in but one were they more contracted than usual, in two others there was neither evident contraction nor dilatation. Of the other cases none are noted as presenting the anormal contraction of the pupils; rather more than half the number offered an evident dilatation. Strabismus existed in a majority of the cases. Loss of sight occurred but rarely. The hearing was acute, even more so than in the natural state in the patients who entered the hospital in the earlier periods of the disease; it afterwards became extremely obtuse.

The intelligence at first offered no deviation from the natural state, except the increase of vivacity and greater petulance of the child; but it gradually became dull, and at the same time confused; this state was replaced by delirium or stupor. Complete coma existed in many cases before death. The stupor was not unfrequently much diminished during the course of the disease, sometimes to so great a degree that the child could understand and answer correctly the questions proposed to it; this remission is by no means a favourable sign.

The symptoms detailed are those of greatest interest in this affection, the patients were examined in relation to several other points, but they are scarcely of sufficient moment to render an analysis absolutely necessary; except of the state of the pulse and the respiration. The pulse it will be seen was slow, 70, 80, or 90 at first, and through the whole disease until near the termination, when it became much more rapid; the slowness of the pulse was found in all the cases which were admitted some days before death; the augmentation in the number of the pulsations was almost constant, there was but one exception, (No. 2,) amongst those which I examined. The respiration was at first irregular, neither slow nor much increased in frequency, but accompanied with a peculiar sigh in the expiration; towards the close it became stertorous, more frequent and much more elevated.

In concluding the sketch of the symptoms the countenance should not be forgotten; as in this affection it is so peculiar, that the sister of one of the wards at the Children's Hospital was accustomed to distinguish the disease with much accuracy from the mere aspect of the child. The face is pale, with occasional flushes of redness on one or both cheeks; mouth frequently a little deviated; lips compressed, or half open; the eyelids are almost invariably closed, or a little separated; nostrils widely dilated. But the most distinctive character is the peculiar listless expression, with occasional grimaces and movements of the lips, as if tasting an article of food; this character does not admit of description, it must be seen to be appreciated.

Diagnosis.—The disease just described is often confounded with certain cerebral symptoms, such as convulsions, which are the attendants of affections other than the tuberculous, or produced by some accidental cause; hence arises the mistake of M. Charpentier, who has evidently compared this fatal disease which he had observed at the childrens hospital with different affections which he witnessed in private practice; the mortality was necessarily very different in the two classes. Can the diagnosis be satisfactorily established? I do not venture to think so, the question is so difficult that it would be presumptuous to resolve it hastily. With the existing facts, we may however attain a greater precision than could have been reached without the aid of pathological anatomy.

I have met with but few diseases resembling this form of cerebral affection, these are—1st, the typhoid or nervous fever of Paris; 2d, the development of an encephaloid mass at the base of the brain; 3d, tubercles in the cortical substance without evident disease of the membranes; 4th, a form of disease which presents closely analogous symptoms, but in which I could discover no decided traces of cerebral lesion; and 5th, the anomalous symptoms which are often confounded with this affection.

The typhoid fever may be readily recognised from the existence of diarrhœa, tympanitis, petechiæ, sibilant rhonchus, and decided febrile pulse. None of these symptoms are met with in the ordinary forms of the cerebral affections. The peculiar alteration of the functions of the nervous system is another distinctive mark.

The encephaloid tumour which I found at the base of the brain in one subject, could only be confounded in symptoms with the isolated tubercles in the cerebral substance, its chronic duration was sufficient to distinguish it from the affection of the membranes.

Tubercles are sometimes found imbedded in the cortical substance of the cerebrum, and more frequently cerebellum, without the existence of any peculiar symptom during life. In other cases the tubercles are larger or more numerous, and then give rise to distinct symptoms, such as partial paralysis and rigidity of the muscles; these cases may be distinguished by their chronic nature, by the gradual diminution of the intelligence and progressive increase of the symptoms. I have collected two observations of this variety, which it is not necessary at present to publish. The fourth variety is probably but a form of the disease described in the observations; the child was tuberculous, and the symptoms were nearly similar to those observed.

in other patients. The apparent severity was however so much less than in the other cases, that strong hopes were entertained of the child's recovery. Was this case an example of the disease before the secretion of the morbid substance?

The last form of disease which is confounded with the tuberculous meningitis, is the various complications supervening during the course of other affections, especially of the alimentary canal. The last variety is in many instances within the controul of treatment, and by no means subject to the same laws as the tuberculous disease. The diagnosis is difficult, but the cases which I have witnessed at the Children's Hospital were still perfectly distinct. In other instances, the symptoms seem to be less easily recognised; I am ignorant whether these simulate the tuberculous affection in all respects.

The diagnosis is then to be founded rather on the succession of the symptoms, than on the separate existence of any one of them. A child labouring under a tuberculous disease of the lungs or abdomen, who should be taken with vomiting, constipation, slowness, and perhaps irregularity of the pulse, with the disorders of the nervous system already enumerated, would be regarded as labouring under this affection. If the child possess all the appearances of perfect health, the diagnosis is a little less certain, but still the order of the symptoms would in the vast majority of cases indicate the nature of the disease to be tuberculous meningitis.

Treatment.—All the cases which I witnessed were fatal; the want of success was not peculiar to the years during which I had observed. M. Charpentier, who had collected a series of cases eight years previously, did not see one recovery at the hospital. M. Rufz collected two cases of cure, which at the time he regarded as examples of the disease. The case to which I alluded of doubtful disease, seemed on the point of recovering, and another patient whom I saw before commencing the series of observations, recovered from the earliest symptoms; this child returned to the hospital some weeks afterwards, and died of tubercles in the lungs; on dissection the membranes of the brain were evidently thickened, although the precise alteration was not noted. The bad success of the treatment was not owing to its want of energy; some of the physicians had tried the most vigorous antiphlogistic means, others had prescribed purgatives together with depletion; and blisters were employed in some cases. I did not witness any attempt to produce rapid salivation by the use of mercurial ointment.

Medicine is necessarily as powerless in the decided cases, as it

is in phthisis or other tubercular affections; but there must be a stage preceding the development of the anormal substance; in this stage therapeutics may be of utility. I have nothing new to add relative to the treatment, which can scarcely become more positively fixed unless the distinction between the several varieties of disease classed under the term acute hydrocephalus or meningitis, be clearly made out. But as it is clearly the duty of a physician in treating cases hitherto incurable, to use those means which seem to offer the greatest chance of benefit, in making my election I should rely chiefly on moderate depletion, and an attempt to salivate the child by mercurial frictions. Very free depletion is not called for in most cases; the patients are scrofulous, and generally do not well bear a great loss of blood.*

ART. X. *Description of a New Œsophagus Forceps.* By CONSTANTINE WEEVER, M. D. of Detroit.

IT is admitted to be of the utmost importance to remove certain foreign bodies from the œsophagus, such as pins, needles, angular pieces of bone, &c. as their presence not unfrequently produces disastrous and fatal consequences; yet it is always a matter of considerable difficulty to extract them with the usual means, and if those bodies are situated near the cardiac termination of the œsophagus, it has generally been found impossible to remove them by the mouth, and the only alternative has been to thrust them into the stomach. This want of success appears to depend chiefly upon the imperfection of the instruments ordinarily employed for this purpose. Every surgeon who has had occasion to use them, knows that their employment is a blind and unscientific groping in the dark, which almost always ends in disappointment.

The above considerations, and a knowledge of the success which has attended the seizure of urinary calculi by the lithontriptic forceps, led me to construct the following instrument.

* The first part of this article was transmitted from Europe; the proof sheets were corrected by a friend, who was unable to decypher a few words of the manuscript; this circumstance will account for some singular verbal errors.

It will be readily perceived that this instrument is particularly calculated to remove those articles from the œsophagus which would prove the most dangerous to life by their presence in the alimentary passages; pins, needles, and sharp pieces of bone, are of this class. These forceps can be easily pressed down the throat, as the elastic branches accommodate themselves to the varying dimensions of the passage, and if the extraneous body does not come within their grasp in their first introduction, they must be withdrawn and the stilet turned one-fourth round, which will bring the blades of the forceps at a right angle with their former position; when they are again to be passed down, and the object of search will be seized with much certainty. When the inner branches pass beyond the foreign substance, the movement is accompanied by a sensible click, which gives notice that the tube is to be pressed down a short distance while the stilet is held stationary; by this means the blades of the forceps are closely approximated, and whatever is within their grasp, will be firmly retained, and may be generally withdrawn without difficulty. One advantage of this instrument is this, that the materials of which it is composed, may be obtained in nearly every country village, and it can be constructed by any man of ordinary ingenuity. In children, a flexible catheter will answer well for the tube, by removing its vesical extremity; and in adults the stomach tube, or in its absence, take a piece of wire of convenient flexibility, two feet in length, put one end of this into a circle about one-eighth of an inch in diameter, and then bend this circle to a right angle with the shaft of the wire. This will serve every purpose for compressing the blades of the forceps.

b. An elastic tube.
c. Whalebone stilet extending through the tube.
d. d Blades of the forceps firmly fixed to the stilet.
a. a. Section of the blades of the forceps, the proper size; their outer side is rounded, and the inner is brought to an edge, and is made rough like the end of a common forceps.

The springs or forceps proper can be admirably constructed from the mainspring of a watch, by moderately heating it in the blaze of a lamp at the points where it is intended to make the acute angle, and form the internal branches.

Detroit, January 15th, 1834.

[Note.—Mr. George P. Schively, an ingenious surgeon's instrument-maker of this city, to whom we communicated the preced-

ing article, has made an instrument, which is very accurately represented in the accompanying figure. This instrument differs slightly from that described by Dr. Weever, in the blades of the forceps being nearly straight instead of curved; and in their being of a somewhat oval form instead of flat. These we conceive to be considerable improvements, as this instrument will be less likely than the original one to pass a foreign body in the œsophagus when the body is slender, as a pin or needle, or fish-bone; and also will not be liable to catch hold of the œsophagus.—EDITOR.]

ART. XI. *On the Efficacy of a Mixture of Camphor and Muriate of Ammonia in the Treatment of Suppression of Urine.* By ALEXANDER SOMERVAIL, M. D. of Loretto, Essex County, Virginia.

SUPPRESSION of urine is often produced from the situation of patients preventing them from evacuating the bladder when it is demanded, and they continue to suffer until they are at liberty, and then the power of evacuation is lost. The bladder, from over-distension, is paralyzed, and the sufferings of the patient go on increasing. The catheter is the usual and effectual remedy, and this must be repeated twice a day, till the lost power of evacuation is restored. With those patients which I have had, this has never returned till the end of the seventh day from the first introduction of the catheter, and never before, unless it has been used in a few hours after the retention began. I have had many cases so as to ascertain this, and been a witness of much suffering, and one death because the parts became inflamed and the catheter could not be introduced. I have heard of several deaths from the same cause, and such must often be the case. Since the use of elastic catheters, there is less danger when they can be introduced, because they can remain in for some days, and are easier introduced again. This I have done several times, still it is painful, and even dangerous, under many circumstances, and an easier remedy is desirable. This has been put in my power, as I think the following cases prove.

In September, 1830, I had a patient, a black woman, who was suffering from fever, attended by suppression of urine; of this latter affection I was not told. She recovered in a week. In October, 1831, she had a child, and an entire suppression of urine took place about two weeks afterwards. As usual, I told her I must use the catheter. She then said, cannot you give me the same medicine you gave me last year? I got well directly. On inquiry, she said she was then in pain from the same

cause and the medicine then given for the fever removed it. I gave her the mixture then used, which consisted of three grains of camphor and five grains of muriate of ammonia, made into an emulsion with gum Arabic, taken every two hours. Next day the suppression was removed, and did not return.

In April, 1832, an elderly free mulatto woman was much swelled from dropsy, the breathing distressing, and in the last days of pregnancy. She took an infusion of digitalis, which relieved the breathing: next day she was delivered. The infusion was left off, expecting all would pass off as usual. In a day or two the dyspnœa returned and the swelling continued. The digitalis was again given. It operated effectually; the breathing was relieved, the urine flowed in abundance, and the swelling disappeared. In the afternoon she disobeyed the call to make water, and suppression followed. I gave the camphor and sal ammoniac, as in the other case. In the evening she was a little relieved, the urine passed afforded relief. She only took three doses, a neighbour persuading her parsley root tea was better. I then urged her to take the mixture every two hours; this she did faithfully, and continued it for two days, and was completely relieved. She was then taken with frequent calls, accompanied with straining and ardor urinæ; the bladder empty. She was directed to drink half a pint of water every half hour till this was better, which was soon accomplished, and no more difficulty.

In October, 1833, a white woman, advanced in years, and who had been long sick, was overtaken with suppression of urine for several days, the bladder much distended, and suffering as usual. She took the same mixture, and was relieved that same day. Next day no obstruction remained, and this did not return.

On the 20th of January, 1834, I saw another white woman, the mother of a large family, who suffered for several days as usual. I gave her the mixture, she was at ease in half an hour. On the 3d of February, she was again in the same situation. I gave her the camphor only, thinking that was the active medicine. This she took that day and the next, growing worse all the time. In the morning she sent to me, stating her sufferings, I sent the sal ammoniac to mix with the camphor. The day after I went to see her. She said after the second dose she was quite relieved, and continued so. She had no sleep for three nights from suffering, but this night she slept so profoundly that those with her thought she was dead.

When I got home to-day, I found the daughter of a woman who had suffered in this way a year ago, and was relieved by the mixture. She was now again getting bad, and requested the same medicine,

which I sent, and saw her next day. She was better, but had only taken one dose, because it made her sick. I gave the sal ammoniac by itself, which did very well. This was not suppression, only dysuria, but the first attack was suppression.

Loretto, Essex County, Virginia, March 15th, 1834.

ART. XII. *Cases of Neuralgia with Remarks.* By W. A. GILLESPIE, M. D. of Louisa, Virginia.

IT is not perhaps sufficiently well-known to the members of the medical profession, that tooth-ache, and what is vulgarly called jaw-ache, are frequently of neuralgic character and of miasmatic origin.* Many cases of this kind are submitted to the manual dexterity of some neighbouring mechanic, who extracts tooth after tooth, until at length the disconsolate sufferer, without experiencing the least relief, frequently abandons himself, in despair, to the most excruciating agony. Several cases have come under my observation, in which perfectly sound teeth have been removed, and often several in succession in consequence of no relief being afforded from the extraction of the first. In addition to this, tooth-ache drops of various kinds, many of which contain mineral acids, are used by the tormented sufferer in profusion, to the eventual destruction of his few remaining instruments of mastication. I am by no means opposed to the extraction of teeth, in proper cases, with due discrimination and reference to collateral circumstances. Carious, useless teeth should always be removed; but under scarcely any circumstance would I be disposed to remove a sound useful tooth. When odontalgia is produced by slight caries, complete success has been known to follow the mere starting of the tooth from the socket by the instrument, and immediately pushing it back into its natural position, thus destroying its nervous connection, whilst the tooth adhered firmly to the socket, and answered, in a good degree, the purpose for which it was intended. The following cases exemplify the success of quinine in neuralgic odontalgia. Notwithstanding the labours of many late writers, the pathology of neuralgia is still involved in much obscurity; but I believe no remedy, as a general one, is preferable to the sulphate of quinine. Many cases that were formerly termed rheumatism, ought manifestly to be classed with neuralgia; it is in

* M'Culloch, Bell, &c.

this way only that we can account for the many high encomiums passed on the Peruvian bark, as a remedy in acute rheumatism, by Drs. Hugh Smith, George Fordyce, Dr. Haygarth, &c.

Case I. *July 29th.*—Mrs. S. had been subject to violent tooth-ache, or jaw-ache as she termed it, for three months; during this time she had applied to a mechanic who had extracted at different periods three sound teeth. No relief being afforded it was thought proper to have professional aid, and accordingly I was called to the patient a few hours after the extraction of the third tooth. It was one of the large molares of the upper jaw, perfectly sound, and its removal had had no effect on the pain, which was of that lancinating, shooting character, too intolerable almost to be borne, at least not without the greatest fortitude. Upon inquiry, finding the pain to have regular periodical exacerbations, and knowing the patient to be exposed to the miasms of a marsh which had produced in the same season some violent cases of remittent and intermittent fever, I viewed the disease as of miasmatic origin, and prescribed sulphate of quinine in free doses. There was in a short time a suspension of the paroxysms, and the patient, on account of the disagreeable taste of the quinine which was given in solution, discontinued its use.

August 15th.—The paroxysms of pain had now returned more severe than usual, I was again called to the patient, and again prescribed quinine which was not taken as directed, and on 20th I saw her again. I now prepared some pills of quinine, and represented to the patient the absolute necessity of taking them constantly and regularly, and predicted with confidence almost certain relief from her excruciating torments. She now took the medicine as prescribed regularly, and had the satisfaction of informing me during the same week that she had escaped the periodical returns of her distressing complaint, and was now well satisfied that the medicine had controlled it. She has since had no return of it.

Case II. *September 28th.*—I was called to Mrs. K. residing in the immediate vicinity of the foregoing case, and exposed to the same miasms. She had suffered for two months with tooth-ache as she termed it, and had had two teeth extracted, both perfectly sound, with no relief; and having heard of the preceding case, she now concluded her's to be a similar one, which I found on examination to be the fact. Quinine was prescribed as above, and in a few days entire and perfect relief followed. Fomentations, blisters and purgatives had previously been used in this case with no perceptible relief.

She has since had no return.

Ellisville, December 15th, 1833.

REVIEWS.

ART. XIII. *Experiments and Observations on the Gastric Juice, and the Physiology of Digestion.* By WILLIAM BEAUMONT, M. D. Surgeon in the United States' Army. Plattsburgh, 1833. 8vo. pp. 280.

NOTWITHSTANDING the numerous treatises on digestion with which our medical libraries abound, and the extensive and repeated series of experiments that have been performed, within the last sixty years, in order to determine the nature of the changes which the food undergoes in the stomach, and the manner in which those changes are effected, but little satisfactory was known in relation to this important part of human physiology until a very recent period. Previously, indeed, to the publication in 1825 of the experiments of TIEDEMANN and GMELIN, of Heidelberg, and the contemporaneous ones of LEURET and LASSAIGNE of Paris, almost every thing in relation to the subject was involved in doubt and obscurity. By the investigations of these gentlemen many facts have been fully established, and not a few obscurities removed. But as important as have been the results of their labours, they are very far from affording the materials necessary for framing a clear and satisfactory theory of digestion. The fact is, that the investigation of this process is attended, under ordinary circumstances, with difficulties it is scarcely possible to surmount. Experiments in relation to it are necessarily performed upon the lower classes of animals, and they are consequently always liable to more or less error: while it is impossible to multiply them, upon the same subject, to the extent that is necessary, in order to study the successive changes which the food undergoes during chymification, as well as other important particulars in relation to the process, without deranging the regular healthy actions of the stomach. Hence all experiments performed upon living animals are to a certain extent inconclusive; upon certain points connected with the process of digestion they throw no light whatever. As was long since remarked by a very sensible writer on stomachic digestion*—

"To arrive at any thing like positive conclusions in regard to this subject, the experimenter must be enabled to inspect the interior of the healthy sto-

* Raynier, De Digestione in Ventriculo, 1792.

mach whilst its functions are going on, and study there the modifications which the composition of the alimentary bolus undergoes, from its entrance through the cardia until its final escape by the pylorus—we shall then, but I fear not before, be able to say what is the nature of digestion, and what are the powers by which it is effected."

The opportunity here required, the occurrence of which was no doubt thought impossible by the writer just quoted, has actually been furnished to Dr. Beaumont, whose observations and experiments on digestion constitute the subject of the work before us. By a surgical case, nearly unique in its results, the interior of the stomach, in a state of health, and in the perfect performance of its functions, has been laid open to his view, and he has been enabled to study daily, for a series of years, the actions of that important organ—to mark the successive changes produced in the food during the process of digestion, and to determine with accuracy the composition and properties of the gastric fluids, and their effects upon the different kinds of aliment in ordinary use. With a laudable degree of zeal and industry, Dr. Beaumont has improved an opportunity for successfully investigating the process of digestion, which no inquirer ever before, or perhaps will ever again possess; and the results of his investigations are, as will readily be presumed, in the highest degree interesting. He has not, it is true, made any important discovery, but he has been enabled to settle conclusively many points which have heretofore been subjects of dispute, and to throw very considerable light upon others in relation to which our views were formerly vague and confused. The report of his experiments and observations constitutes, unquestionably, in many particulars, the most important work ever published on the physiology of digestion. But while we freely concede to it this, as we believe, merited degree of praise, we must, at the same time, be permitted to say, after a very careful and repeated perusal of the work, that we have been not a little disappointed in finding that so much is left in regard to the process of digestion still uninvestigated. With the peculiar facilities for studying the subject in its fullest extent, possessed by Dr. B., he has certainly effected far less than we had anticipated. His experiments so far from solving the two great problems in regard to the physiology of the stomach; namely, 1st, in what does chymification consist, and 2d, in what manner is it effected?; leave the first in all the obscurity it was before involved. Dr. B. has been evidently called, by circumstances, to the performance of a task, with little of that preparation so essential for its accomplishment. He appears not to have taken sufficient pains to become acquainted with the labours of his predecessors and contem-

poraries in the same field of investigation. Had he studied with attention the experiments, at least of CHAUSSIER and MONTEGRE, and the more recent ones of Tiedemann and Gmelin, and Leuret and Laissaigne, he would have avoided one or two errors into which he has fallen when alluding to the actual state of our knowledge on the subject of digestion, while a variety of comparative experiments would have been suggested to him, the result of which would have tended, in a very great degree, to settle certain disputed points in regard to the real action of the gastric fluid; experiments which can be performed, in a satisfactory manner, only with the peculiar facilities which he possessed. The doctor is also, unfortunately, devoid of that proficiency in the details of practical chemistry which is all-important in conducting experimental investigations into the action of the gastric juice, and into the process of digestion generally. Had he been able to test, by a careful analysis, the changes which the food undergoes during its conversion into chyme, and compared these with the changes induced in it by the action of the gastric juice out of the body, he might, in all probability, have been enabled to claim the honour of having fully and satisfactorily explained the mode in which stomachic digestion is effected; he would, at least, have set at rest the dispute which exists between those physiologists who refer chymification to the vital action of the stomach, aided by the solvent powers of the salivary and gastric fluids, and those who maintain that it is to be ascribed solely to a specific solvent secreted by the vessels of the stomach.

We do not wish to be understood by these remarks as detracting the least from the high praise we have already bestowed upon the labours of Dr. Beaumont. These are unquestionably all-important—and have advanced, in a very great degree, our knowledge of one of the most important of the animal functions; giving to us facts in relation to numerous particulars where before we were in possession of merely plausible hypotheses. All we regret is, that the peculiar advantages possessed by Dr. B. for studying the process of digestion, had not fallen to the lot of some one better qualified, in certain respects, for deriving from them *all* the advantages to physiology they were so well calculated to afford.

We have every confidence in the good faith in which the experiments of our author were performed, and the accuracy with which they are reported. He appears, however, to have been too firmly prepossessed with the idea, that in order to convict of error those who deny the validity of the deductions drawn, by the majority of physiologists, from the experiments heretofore performed in relation

to the subject of digestion, all that was necessary was to establish the fact of the solvent powers of the gastric juice. His having overlooked the real points in dispute between these gentlemen, and such as advocate the existence of a specific chemical solvent, as the agent of chymification, has led him to denounce all who dissent from the opinions of the latter, as "men of vivid imaginations, and great powers of mind," who "become restive under the restraints of a tedious and *routine* mode of thinking, and strike out into bold and original hypotheses to elucidate the operations of nature, &c.;" who are "averse to the slow and tedious processes by which truths are attained." To whose "notions of unrestrained genius—the process of developing truth, by patient and persevering investigation, experiment and research, is incompatible;" and who advance *heresies* for "the gratification of a *morbid* desire to be distinguished as the propagators of new principles in philosophy, or as the head of a new sect." When Dr. Beaumont employed this language he was certainly unaware, that on the list of the denounced are to be found the names of several of the most cautious and laborious investigators among the physiologists of this country and of Europe; and that the greater number, so far from denying the solvent powers of the gastric fluids, have performed numerous experiments to prove the fact. But even admitting that Dr. B. had succeeded in proving their opinions in regard to digestion to be erroneous, he should have recollected that no one of them possessed the advantages for investigating satisfactorily the subject, which accident has placed at his command; their rejection of conclusions drawn from experiments so inconclusive and contradictory as those that have heretofore been performed in relation to stomachic digestion, is rather to be viewed as an indication of philosophic caution, than as a fondness for bold hypothesis. But the fact is, the incorrectness of the views of these gentlemen, in many respects at least, is still far from being established: and here we may suggest to Dr. B. that he can claim no credit whatever for the opportunity he possessed for pursuing the course of experiments detailed in the work before us, but only so far as he has improved that opportunity for the advancement of knowledge.

In our examination of the work before us, we shall endeavour to present to our readers a clear view of the facts and deductions of the author, with an occasional comment upon some of the opinions which he has advanced. We shall follow, however, a somewhat different arrangement from that adopted by Dr. Beaumont.

The subject upon which the experiments of the latter were performed, is a young man, of a good constitution, robust and healthy,

who, on the 6th of June, 1822, he being then eighteen years of age, was accidentally wounded by the discharge of a musket loaded with buck-shot. The load entered his body posteriorly, and in an oblique direction, forwards and inwards, literally blowing off a portion of the integuments and muscles of the size of a man's hand, fracturing and carrying away the anterior half of the sixth rib; fracturing the fifth; lacerating the lower portion of the left lobe of the lungs and the diaphragm, and perforating the stomach. On examination, twenty-five or thirty minutes after the accident, a portion of the lung, as large as a turkey's egg, was found protruding through the exterior wound, lacerated and burnt, and immediately below this, was "another protrusion, which, on further examination, proved to be a portion of the stomach, lacerated through all its coats, and pouring out the food" that had been eaten in the morning "through an orifice large enough to admit the forefinger."

It is unnecessary, on the present occasion, to follow out the surgical details of the accident and its treatment. For seventeen days every thing that was taken by the mouth soon passed out at the wound, and the only manner in which the patient was sustained was by nutritious injections per anum. During this period alvine evacuations could not be obtained, notwithstanding cathartic enemata were given, and various other means adopted to promote them. As soon, however, as compresses and adhesive straps could be applied over the opening into the stomach, and food was retained in the latter, by the aid of purgative injections, a very hard, black, fetid stool was procured, followed by several similar ones; after which the bowels became quite regular, and continued so.

"No sickness, nor unusual irritation of the stomach, not even the slightest nausea, was manifest during the whole time; and, after the fourth week, the appetite became good, digestion regular, the alvine evacuations natural, and all the functions of the system perfect and healthy.

"By the adhesion of the sides of the protruded portions of the stomach to the pleura costalis and the external wound, a free exit was afforded to the contents of that organ, and effusion into the abdominal cavity was thereby prevented."

Cicatrization and contraction of the external wound commenced in the fifth week; the stomach became more firmly attached to the pleura, but the orifice still remained open. This resembled, in every thing but the absence of a sphincter, the natural anus, with a slight prolapsus. At every dressing it allowed the contents of the stomach to flow out, in proportion to the quantity recently taken, and when

the stomach was empty, or nearly so, a partial inversion would take place, unless prevented by the application of the finger.

"Frequently, in consequence of the derangement of the dressing, the inverted part would be found of the size of a hen's egg. No difficulty, however, was experienced in reducing it by gentle pressure with the finger, or a sponge wet with cold water, neither of which produced the least pain.

"In the seventh week—the circumference of the external wound was at least twelve inches, and the orifice in the stomach nearly in the centre, two inches below the left nipple, in a line drawn from this to the point of the left ilium."

The food and drinks taken into the stomach were prevented from escaping through the perforation by a compress and tent of linen kept on by adhesive strips.

By the 6th of June, 1823, one year from the occurrence of the accident, the injured parts were all sound and firmly cicatrized, with the exception of the perforation leading into the stomach, which was about two and a half inches in circumference. From this time the patient continued gradually to improve in health and strength, and the newly-formed integuments became more and more firm.

"At the point where the lacerated edges of the muscular coat of the stomach and intercostal muscles met, and united with the cutis vera, the *cuticle* of the external surface, and the *mucous membrane* of the stomach *approached* each other very nearly. They did not unite, like those of the lips, nose, &c. but left an intermediate marginal space, of appreciable breadth, completely surrounding the aperture. This space is about a line wide, and the cutis and nervous papillæ are unprotected, *and* as sensible and irritable as a blistered surface abraded of the cuticle. This condition of the aperture still continues, and constitutes the principal and almost only cause of pain or distress experienced from the continuance of the aperture, the introduction of instruments, &c. in the experiments, or the exudation of fluids from the gastric cavity."

Compresses and bandages were constantly demanded, to prevent the escape of the food from the stomach, until the winter of 1823–4; at this period a small fold or doubling of the inner coats of the stomach appeared, forming at the superior margin of the orifice, slightly protruding, and increasing in size until it filled the aperture. This valvular formation adapted itself to the opening into the stomach, so as completely to prevent the efflux of the gastric contents when the stomach is full, but was easily depressed by the finger. When the stomach is empty it plays up and down simultaneously with the respiratory muscles.

In the spring of 1824 the individual had perfectly recovered his natural health and strength. The aperture in the stomach still remained, but the surrounding wound was firmly cicatrized to its

edges. From this period to the present time he has enjoyed general good health. He has been active, athletic, and vigorous; exercising, eating and drinking like other healthy and active people. For the last four months, (of the autumn of 1833,) he has been unusually plethoric and robust, though constantly subjected to a continued series of experiments on the interior of the stomach; allowing to be introduced or taken out, at the aperture, different kinds of food, drinks, various instruments, and the different contents of the stomach, almost daily, and sometimes hourly.

The perforation through the coats of the stomach is situated about three inches to the left of the cardia, near the left superior termination of the great curvature. On pressing down the valve when the stomach is full, the contents flow out copiously.

"When the stomach is nearly empty and quiescent, the interior of its cavity may be examined to the depth of five or six inches if kept distended by artificial means; and the food and drinks may be seen entering, if swallowed at this time, through the ring of the œsophagus. When entirely empty, the stomach contracts upon itself, and sometimes forces the valve through the orifice, together with an additional portion of the mucous membrane, which becomes completely inverted, forming a tumour as large as a hen's egg. After lying on the left side, and sleeping a few hours, a still larger portion protrudes, and spreads out over the external integuments, five or six inches in circumference, fairly exhibiting the natural rugæ, villous membrane, and mucous coat (?) lining the gastric cavity. This appearance is almost invariably exhibited in the morning, before rising from bed."

Dr. Beaumont commenced his first series of experiments in May, 1825; in the month of August ensuing, the young man, upon whom they were performed, returned to Canada, of which place he was a native, where he remained four years. In August, 1829, he came again to the United States, and entered into the service of Dr. B. when the latter commenced a second series of experiments, and continued them uninterruptedly until March, 1831. Soon after this period, circumstances made it expedient for the subject of the experiments to return, with his family, again to Canada. In November, 1832, he once more came back and engaged himself to Dr. B. for twelve months, for the express purpose of submitting to another series of experiments, which were performed on him at Washington, and continued to March, 1833. In July of the same year, a fourth series of experiments were commenced at Plattsburgh, New York, and completed on the first of November, 1833.

"The usual method of extracting the gastric juice, for experiment, is by placing the subject on his right side, depressing the valve within the aperture, introducing a gum-elastic tube, of the size of a large quill, five or six inches

into the stomach, and then turning him on the left side, until the orifice becomes dependent.

"On introducing the tube, the fluid soon begins to flow, first by drops, then in an interrupted, and sometimes in a short continuous stream—Moving the tube about, up and down, or backwards and forwards, increases the discharge. The quantity of fluid ordinarily obtained is from four drachms to one and a half or two ounces, varying with the circumstances and condition of the stomach. Its extraction is generally attended by that peculiar sensation at the pit of the stomach, termed sinking, with some degree of faintness, which renders it necessary to stop the operation. The usual time of extracting the juice is early in the morning, before eating, when the stomach is empty and clean."

The fluid obtained in this manner, when unmixed with any thing excepting a portion of the mucus of the stomach, with which it is perhaps always combined, is clear and transparent, inodorous, a little saltish, and very perceptibly acid to the taste; having the flavour, when applied to the tongue, of thin mucilage slightly acidulated with muriatic acid. It is readily diffusible in water, wine, or spirits; slightly effervesces upon the addition of alkalies; possesses the property of coagulating albumen in an eminent degree; is powerfully antiseptic, checking the putrefaction of meat, and effectually restoring the healthy action when applied to old, fœtid sores, and foul ulcerating surfaces. When not separated by filtering, the mucus combined with the fluid, gives to it a degree of ropiness, but soon falls to the bottom in loose, white flocculi. Saliva imparts to the gastric fluid an azure tinge and frothy appearance.

Equal parts of the gastric fluid and alcohol, mixed together and agitated, produced a turbid, milk-white fluid, upon the surface of which, after standing at rest, was formed a thin, white coat of fine, loose coagula. When the alcohol was first added to the fluid, and before the two were mixed by agitation, the latter settled to the bottom while the alcohol remained on the top, indicating that its specific gravity was less than that of the fluid.

The sensible properties of the gastric fluid are changed by a variety of circumstances; as by the admixture of saliva, water, mucus, and occasionally bile, perhaps, also, pancreatic juice. Derangement of the digestive organs, slight febrile excitement, fright, or any sudden emotion of the mind, occasions, also, material alterations in its appearance. Excess in eating causes a rancid state of the fluid, by which its solvent action is retarded. Dr. Beaumont conceives, however, that the special solvent itself—*the gastric juice*—is probably, "invariably the same substance." The correctness of this latter opinion, the experiments before us are far, however, from establishing. It would be an interesting inquiry, which we are somewhat sur-

prised Dr. B. has never thought of instituting, to ascertain whether the composition of the gastric juice is not varied according to the kind of aliment to which the individual is confined. According to MM. Chaussier, Virey, Pinel, and Voisin, the properties of the solvent fluid secreted by the stomach differ in different classes of animals, and in the human subject at different periods, and that this difference has a direct relation to the nature of the food. The first mentioned gentleman states, that its acidity is the greatest in herbivorous animals, the least in the carnivorous.

In regard to the composition of the gastric fluid, a portion examined by Professors Dunglison and Emmett was found to contain free *hydrochloric* and *acetic* acids, *phosphates* and *hydrochlorates*, with bases of *potassa*, *soda*, *magnesia*, and *lime*, and an animal matter soluble in cold water, but insoluble in hot. The existence of free *hydrochloric* acid in the gastric fluid was also evinced in the portion examined by Professor Silliman; in all other respects, however, the analysis of the latter gentleman is any thing but satisfactory.

The result of Professors Dunglison and Emmett's analysis corresponds very nearly with that of Tiedemann and Gmelin, who found the gastric fluid to contain, besides mucus, osmazome, and salivary matter, hydrochloric and acetic acids, alkaline sulphates and hydrochlorates, the alkali being chiefly soda; phosphate and muriate of lime and other salts in minute proportions.

Leuret and Lassaigne state the component parts of gastric juice to be water, hydrochlorate of ammonia, chloride of sodium, mucus, an animal principle soluble in water, phosphate of lime and lactic acid; they deny, however, the existence in it of free hydrochloric acid.

Now, as the lactic acid of Leuret and Lassaigne has been shown by Berzelius to be merely a variety of the acetic, the existence of the latter in gastric juice may be considered as settled; while the researches of Prout, Children, Graves, Tiedemann and Gmelin, borne out as they are by the analysis of Dunglison, Emmet, and Silliman, establish likewise, we conceive, beyond the possibility of doubt, the presence of the hydrochloric acid in a free state.

The solvent power of the gastric juice, in relation to which so much doubt and uncertainty have heretofore existed, is proved in the most conclusive manner by Dr. Beaumont. It can never again become a subject of dispute. Almost every variety of alimentary matter, whether animal or vegetable, when submitted to the action of the fluid taken from the stomach, and kept at a temperature of about 100° Fahrenheit, was found to become, in a few hours, completely

softened and reduced to a paste, resembling very nearly the contents of the stomach a short period after the same kinds of aliment had been eaten. The rapidity with which the substances were dissolved by the gastric fluid out of the body, was always in proportion to the purity of the fluid, and the tenderness of fibre and state of minute division of the substances submitted to its action. Milk and liquid albumen were found invariably to be first coagulated by the gastric fluid and then dissolved. The solution of only a certain proportion of any given aliment was effected by a certain quantity of gastric juice. Thus it was found, in many experiments, that the articles submitted to the action of the fluid taken from the stomach became softened or dissolved to a certain extent, when all further change would cease; but when more gastric juice was added, the process of solution would again commence. Cold gastric juice was found to be almost entirely inert. In one experiment, a piece of roasted beef was submitted to the action of the fluid placed in the open air at a temperature of 34°; after twenty-four hours it was not in the least dissolved. The temperature of the fluid being now raised to 100°, the process of solution commenced and advanced regularly.

A curious fact is shown by the experiments of Dr. B.; that food, namely, taken from the stomach a short time after it has been eaten and thoroughly mixed with the gastric juice, will become completely dissolved, provided it be kept at a temperature of 100°.

Dr. B. has found that the gastric fluid undergoes little or no change when kept in vials for a length of time. On the 1st of November, 1833, he added to one ounce of the fluid taken from the stomach eleven months before, and which was as pure as when first extracted, thirty grains of lean mutton, boiled and masticated. The whole being placed in the axilla for six hours, sixteen grains of the meat became dissolved; the solution presenting the usual appearance of chyme.

The period, as well as the quantity of gastric juice required for the solution of different alimentary substances out of the body varied, as we have already remarked, according to the density of their texture, and their state of division. Sago and tapioca, boiled, were dissolved completely in about 3 hours and 15 minutes; fresh wheat bread in 4 h. 30 min.; milk, boiled, in 4 h. 15 min.; unboiled, in 4 h. 45 min.; gelatine, boiled, in 4 h. 45 min.; hard-boiled eggs, in 8 h.; soft-boiled, in 6 h. 30 min.; oysters, raw and entire, in 7 h. 30 min.; stewed, in 8 h. 25 min.; beefsteak, in 8 h.; boiled beef, in 9 h. 30 min.; raw pork, in 8 h. 30 min.; fresh mutton, boiled, in 8 h. 30 min.; beef suet, boiled and entire, in 12 h.; mutton suet, boiled and di-

vided, 10 h.; cream, 25 h. 30 min.; olive oil, 60 h.; apples, raw and entire, 18 h.; masticated, 8 h. 30 min.; turnips, boiled and entire, 13 h. 15 min.; raw, 18 h.; boiled potatoes, entire, 14 h.; mashed, 8 h. 30 min.; boiled parsnips, mashed, 6 h. 45 min.; entire, 13 h. 15 min.; raw and entire, 16 h.; raw cabbage, masticated, 12 h. 30 min.; boiled, 20 h.; mellow peach, cut small, 10 h.; mashed, 6 h. An entire portion of boiled tendon required 24 h. for its solution; when masticated, 12 h. 45 min.; a portion of boiled cartilage, divided, 12 h.; masticated, 10 h.; and a solid piece of bone, boiled, 80 h. In the above experiments the quantity of gastric juice employed was one ounce nearly to a drachm of the article submitted to its action.

By the above statement it will be seen that fat and oily food was among the articles which presented the greatest resistance to the solvent powers of the gastric fluid; this Dr. B. found to be invariably the case, as well in the stomach as out of it. Some of his experiments would seem to indicate that the digestibility of this species of food is facilitated by a slight admixture of bile with the gastric juice, and that, very generally, when aliment containing any quantity of fat is eaten, bile is very generally found in the cavity of the stomach.

We felt extremely desirous of comparing the observations of our author in relation to the changes produced, in the healthy process of digestion, upon the different alimentary substances, with those of Tiedemann and Gmelin, by whom this subject has been examined with uncommon care and minuteness; but the want of precision in the description given of those changes by the former, and the entire absence of any thing like chemical analysis, prevent this from being done in a manner calculated to lead to satisfactory results. Taking, however, the articles albumen, gelatine, new cheese and bone, we shall give first the observations of the German experimenters, and then subjoin those of Dr. Beaumont.

Tiedemann and Gmelin found, that in the natural process of digestions, *liquid albumen* forms a homogeneous fluid, in which the albumen remains entirely unchanged; this species of chyme, they remark, passes the pylorus more rapidly than any other. *Coagulated albumen* they found to be much more slowly dissolved; the fluid formed possessing the properties of coagulated albumen dissolved in acetic acid.

Gelatine they found to be converted into a clear brownish fluid, in which neither gelatine nor albumen could be discovered.

New cheese, according to these gentlemen, forms an opaque, dirty-white fluid, which contains much animal matter, which is neither casein, gelatine, nor albumen.

Bones, in their experiments, formed a liquid, which contained not only animal matter, but also a large amount of lime.

The following observations in regard to the changes produced in the same substances, are derived from the experiments of Dr. Beaumont, performed, in the majority of cases, with the gastric juice out of the body; with the general statement that they resembled very nearly the changes which similar aliment was found to undergo when submitted to the natural actions of the stomach.

When gastric juice and *liquid albumen* were mixed together, they were so much alike in their appearance at first, that no change was perceptible; but in ten or fifteen minutes, small, white flocculi began to appear, floating about, and the mixture became of an opaque whitish appearance. This appearance continued slowly and uniformly to increase for three hours, at which time the fluid had become of a milky appearance; the small flocculi had mostly disappeared, and a little light coloured sediment subsided to the bottom. No results are given of the action of the gastric fluid upon *coagulated albumen.*

Eight ounces of calf's-foot *jelly* alone were swallowed at 1 o'clock, P. M. The stomach being examined in twenty minutes, its contents were found to consist of gastric juice combined with the jelly, nearly all of which was in a fluid state; a few particles only of entire jelly were suspended in the fluid, with a few small, yellowish coagula floating near the surface. At 2 o'clock no appearance of jelly could be discovered. In another experiment, four ounces of pure *gelatine, (ichthyocolla,)* prepared with boiling water, were swallowed at forty-five minutes past eight o'clock, A. M. At the end of fifteen minutes the stomach appeared to be nearly as full as after an ordinary meal; it contained a clear fluid of the consistence of the white of an egg, composed apparently of the gelatine dissolved or diffused in the gastric juice. The two could not, however, be distinguished from each other. After the lapse of forty-five minutes the stomach was found to be nearly empty, all that could be obtained from it being two drachms of a fluid, which appeared to be a mixture of gelatinous chyme, gastric juice, and mucous flocculi, more opaque and ropy than the gastric juice alone, and more acid than were the fluids of the stomach immediately before the gelatine was swallowed.

Thirty grains of *new cheese*, masticated, were put in three drachms of gastric juice, and kept in the axilla for eight hours and thirty minutes, when the vessel was found to contain a rich milky fluid, on which floated five grains of a matter consisting principally of oil combined with a soft caseous substance. The fluid had a strong acid, or

peculiar acrid taste, and emitted a strong caseous smell, even stronger than the cheese itself, before the experiment.

Bone after being dissolved in the gastric juice, formed a grayish, white, opaque fluid, nearly of the colour and consistence of clear, thin gruel, with considerable fine brown sediment after standing at rest a while. It had a peculiar insipid, sweetish taste and smell, without the least fœtor or rancidity.

The solvent powers of the gastric fluid being established, an important inquiry next presents itself; upon what, namely, do those powers depend? In other words, does the gastric juice act upon the food by virtue of certain specific properties which distinguish it from all other chemical agents, or are its solvent powers to be attributed solely to the acids and salts which it contains? The first of these propositions is assumed by Dr. B.

"The action of the stomach and its fluids on aliment is believed," he remarks, "to be *sui generis*, invariably the same on health in all kinds.

"Chyme is a compound of gastric juice and aliment. It may be regarded as a *gastrite* of whatever it is combined with, varied according to the kind of aliment used.

"Like all other chemical agents, the gastric juice decomposes or dissolves, and combines with a fixed and definite quantity of matter when its action ceases."

Without stopping to comment upon the absurd and inadmissible term *gastrite*, applied to the presumed chemical compound resulting from the union of definite proportions of gastric juice and the different alimentary substances, albumen, gelatine, fecula and the like, we shall merely remark, that the specific and invariable character and action of the fluid secreted by the stomach are mere assumptions, which are disproved by the very analysis of the fluid, which shows it to be a *mixture* of mucus, water, and various salts and acids, the nature and chemical action of which are well understood. Not a single experiment is adduced by the author which would lead us even to suspect that the gastric juice possesses any solvent or chemical property other than those which result from the substances which are known to enter into its composition, or that these do not vary, in their relative proportions at least, at different times.

If it can be shown that other of the animal fluids, or even water, with the addition of one or other of the active ingredients contained in the gastric juice, will cause a solution of alimentary substances, similar to that produced by the latter, the idea of any specific action being exerted by it is completely overthrown. As early as 1783, it was stated by Carminati, that he digested veal with a little salt, in

pure water at 100° Fah. and that the veal became partially dissolved. He employed the decanted liquor in similar experiments, until at length he procured, as he asserts, a fluid possessed of solvent properties, similar to those of the gastric juice; and in 1788, STRUVE and MAQUART made an artificial solvent of a weak solution of ammonia, which had the same properties, according to their statement, as the gastric juice. But passing over these experiments, which may be considered inconclusive, we find that Tiedemann and Gmelin in 1825, found that water slightly impregnated with acetic or hydrochloric acid, as well as a weak solution of either the acetate or hydrochlorate of ammonia severally dissolved, more or less of nearly all the animal substances employed as food. Several experiments were likewise performed by Dr. Beaumont, which prove the solvent action upon food of diluted acetic and hydrochloric acids. In one of these experiments, equal portions of beef steak masticated, were immersed in gastric juice, and in an equal quantity of a mixture of muriatic and acetic acids, reduced by the addition of water to the flavour of the gastric fluid as nearly as practicable. Both were kept by means of a sand bath at the temperature of 100° Fah.; at the end of nine hours the meat in the gastric juice was all dissolved—that in the acid mixture when filtered, left a residuum weighing nine grains, of a gelatinous consistence. The solution in the gastric juice was opaque, and of a lightish gray colour, and deposited on standing a brown sediment. That in the acid mixture was also opaque, but of a reddish brown colour, and deposited no sediment.

A similar experiment was repeated with pure dry gelatine. At the end of nine hours the gelatine in the gastric juice was entirely dissolved; that in the acid mixture when filtered, left a residuum of three grains of a gelatinous consistence. The solution in the gastric juice was opaque, and of a whitish colour, with a little fine brown sediment; that in the dilute acids was also opaque, but of a reddish brown colour, and of a thin, mucilaginous consistence, without any sediment. When an infusion of nut-galls was added to the first, it produced a rich cream-like fluid, and slowly precipitated a fine compact sediment; when added to the second, the whole formed immediately into a coarse, brown coagulum. After standing a while, a large, loose, brownish sediment was precipitated, leaving a light coloured fluid, which became subsequently as white as milk, while the sediment became compact, and remained so.

The same experiment with gelatine being repeated, at the end of five hours and a half the portion in the gastric juice was all dissolved to a mere mite, that in the acid mixture nearly so, six grains only, of

a gelatinous consistence, remaining. The fluid in the first was of a bluish-white colour; in the second yellowish, or about the colour of dry gelatine. After remaining two hours and three-quarters longer, the gelatine in the dilute acid was entirely dissolved, and the fluids of both were nearly similar. The addition of an infusion of nut-galls formed in each loose, light-coloured coagula. In the solution formed by the gastric juice a compact sediment was thrown down, leaving an opaque milky fluid. In the solution formed by the acids, the coagula were not precipitated until after the lapse of forty-eight hours, forming then a compact mass with distinct particles of undissolved gelatine mixed with a dirty white-coloured, curd-like substance.

Another experiment was performed with a mixture of hydrochloric and acetic acids, diluted with water to the flavour of gastric juice. In this was immersed a portion of broiled steak, cut fine, and the same amount of steak was immersed in an equal portion of gastric juice. In six hours and three-quarters, the meat in the latter was nearly all dissolved; in eight hours longer, that in the acid mixture was dissolved with the exception of a very small jelly-like mass. The two liquids now resembled each other very nearly. That from the gastric juice being opaque and of a lightish-gray colour, with a dark brown sediment on standing; that from the acid mixture was also opaque, of a reddish-brown colour, but without sediment. The addition of an infusion of galls caused in the first a fine reddish-brown precipitate, leaving an opaque liquor of a similar colour; in the second, a more copious precipitate, leaving a clearer and thinner, almost transparent, liquor of a yellowish colour.

It is well known that Montegre, in experiments performed with the saliva acidulated with vinegar, succeeded in dissolving various articles of food into a chymous pulp. Of the correctness of these experiments we have not the least doubt, having seen them repeated in this city with very similar results to those stated by Montegre, and having before us the additional testimony of a very late French experimenter,* who has shown that the saliva, as well as the mucus of the intestines, obtained by opening the abdomen of an animal before eating, when slightly acidulated and kept at the temperature of the human body, will convert the food immersed in it for twenty-four or thirty-six hours into a grayish, perfectly homogeneous paste. That the intestinal mucus will produce changes in food very analogous to those resulting from the action of the gastric juice, is attested also

* Benjamin Voisin de la Digestion Considerérée en Général. Paris, June, 1833.

by Tiedemann and Gmelin as well as by Leuret and Lassaigne. The following experiment was performed by Dr. Beaumont. Two equal portions of saliva were acidulated to about the flavour of gastric juice, the one with acetic, the other with muriatic acid, and in each were immersed two pieces of parsnip and two of carrot, the one boiled and the other raw, each weighing ten grains. The temperature of the fluids was kept at 100° Fahrenheit. After forty-eight hours, the parsnip in the saliva with muriatic acid had lost four grains, the carrot nothing; the parsnip in the saliva with acetic acid had lost six grains, and the carrot four; they appeared to have been rather macerated and diffused than dissolved or digested. The two fluids and their contents were now mixed together, and after twenty-four hours the whole remaining mass of vegetable matter weighed twelve grains. The fluid appeared now a little more chymous, and was rather turbid.

It strikes us as not a little surprising that these experiments with artificial solvents did not suggest themselves to Dr. B. at a much earlier period than they were performed, (February, 1833,) and that when entered upon they were not more frequently repeated with different articles of food and with acid mixtures of various strength. Incomplete as they are, they, however, prove that as far as it regards its solvent properties at least the gastric fluid is not sui generis.

It will not do to say that the product of these artificial solutions is not identical with that resulting from the action of the gastric juice. This must be proved by a chemical analysis of the two. But even if they should be shown in this manner to differ materially, it is to be recollected that the gastric juice contains chemical agents independently of its acids, all of which are doubtless necessary in causing the solution of the different kinds of food, or perhaps of its different nutritive principles.

Having thus examined the observations of our author upon the nature and action of the gastric juice, we shall proceed next to the consideration of the various phenomena connected with the process of digestion. The opportunities he possessed for the careful study of these render his remarks in relation to them peculiarly interesting. It will be proper, however, to notice first the views of Dr. B. in regard to the uses of the saliva.

Excepting as a means of introducing food into the animal stomach, Dr. Beaumont maintains that mastication and insalivation are to be considered as "perfectly non-essential to chymification." Neither, he conceives, would be necessary could the food in any other way be introduced into the stomach in a finely divided state. The chyme produced

by the action of the gastric fluid, out of the body, on food unmixed with saliva, exhibited, he remarks, the same sensible appearances, and was affected by reägents (?) in the same way, as that which was formed by food which had been previously masticated, mixed with the saliva and swallowed. Subsequently, Dr. B. admits that *mastication* "is absolutely necessary to healthy digestion," that it is to be considered "as one of the most important preliminary steps in the process." Although these different statements amount to a direct contradiction in language, yet we presume that all that is meant is that perfect comminution of the food, in whatever way it may be effected, is essential to its digestion; though we cannot conceive how the process of mastication can be studied in its effects separately from those of insalivation, excepting with the facilities possessed by Dr. B. and of these, so far as we are able to judge from the detail of its experiments, he does not appear to have availed himself. A series of comparative observations, showing the difference in the digestibility of substances swallowed after mastication in the usual manner, and those introduced into the stomach through the opening in a state of minute division only, would have settled the question; especially if the composition of the chyme formed in both instances had been carefully examined. Dr. Beaumont, it is true, asserts, as we have already remarked, that chyme from food mixed with the saliva and swallowed, and that produced by the action of the gastric juice without any mixture of saliva, did not differ in appearance, and was affected similarly by reägents—the results of these experiments are not given in detail, and of course we cannot judge of their accuracy. In one experiment it was found that the saliva, when added to aliment out of the body, had the effect of facilitating the putrefaction of the latter. This agrees with the observations of the recent German and French physiologists, and with those of Montegre. If we even admit that the only effect of this secretion is to induce in the food an incipient state of putrefaction, this of itself, according to our author's own showing, would prove that, so far as it regards animal food, it has a very considerable agency in facilitating digestion, for "the digestibility of most meats," he remarks, "is improved by incipient putrefaction, sufficient to render the muscular fibre slightly tender."

The important part performed by the saliva in digestion, is proved, we conceive, by the fact of the large glandular apparatus for its secretion, with which nearly all animals are furnished; by the great quantity which is poured into the mouth during the process of mastication—far more than would be necessary, if it had no other office, as

supposed by Dr. B., than to facilitate deglutition by lubricating the alimentary bolus; and by the additional fact, that in the duodenum the chyme is invariably mixed with another portion of fluid, identical almost in its composition with the saliva. No one who has examined a portion of food after it has been well masticated, and intimately combined with the fluid furnished by the glands of the mouth, but must be convinced that a very considerable change has been produced in it. I have ascertained *positively*, remarks Dr. Jackson,* that the saliva does exert a very energetic operation on the food; separating, by its solvent properties, some of its constituent principles, and performing a species of digestion. Voisin also† declares, that when the food is retained for a long time in the mouth, and intimately mixed with the saliva, it undergoes an actual change, by which its original character is no longer distinguishable. "I have seen it," he tells us, "converted into a grayish homogeneous pulp, very much like chyme." This change in the appearance of the aliment does not merely consist, he adds, in its conversion into a soft mass, by which it is rendered more easily swallowed—it is something more; the aliment experiences a commencing decomposition. In one experiment related by this author, when food, well triturated and imbued with saliva, was introduced into the small intestine of an animal, in two or three hours its chymification was as complete as if the process had been effected in the stomach. But Dr. Beaumont is not content with setting down the saliva as unnecessary to digestion, he has undertaken to prove further, that it actually impedes the solvent action of the gastric juice. "It would seem," he remarks, "from two or three of the experiments on artificial digestion, which were instituted for the purpose of comparison, that the mixture of saliva with the gastric juice rather retarded its solvent action;" and when mixed in large amount with the gastric fluid, it renders it fœtid in a few days. Were we to admit the opinion of Dr. B. to be correct, namely, that the mixture of saliva with the solvent fluid of the stomach vitiates the latter, this would be equivalent to asserting that digestion by the natural actions of the stomach is less perfect than that performed by filtered gastric juice on finely comminuted aliment out of the body. For we are to recollect that when solid food is eaten, it does not enter the stomach until it is mixed, by the process of mastication, with a large quantity of saliva, and that under ordinary circumstances a portion of the latter is always swallowed, and of course mixes with the other fluids of the digestive organs. But we are persuaded, that whoever

* Principles of Medicine, p. 354. † Opera Citat. pp. 205-302.

will read with attention the experiments of Dr. B., and compare them with each other, must be convinced from them alone, that so far from the saliva being "perfectly non-essential" to digestion, it performs a very important part in facilitating the process.

We shall proceed now to give a sketch of the very interesting observations of our author in regard to various particulars connected with the physiology of the stomach, from the correctness of which we are happy to say, we shall have but few occasions to dissent.

Dr. Beaumont has proved with great clearness, that the gastric juice does not accumulate in the stomach in the intervals of digestion, as many physiologists, and Spallanzani among the number, have supposed; but is secreted only when food is admitted into the gastric cavity, or some other stimulus is applied directly to its lining membrane. This fact was pointed out long since by Chaussier, and more recently by the experiments of Tiedemann and Gmelin, and those of Leuret and Lassaigne.

When it does not contain food, Dr. B. has usually observed the stomach to be empty and contracted, the rugæ formed by its inner coats being irregularly folded upon each other, and almost in a quiescent state. The whole of the mucous membrane of the stomach when perfectly free from disease, is of a light or pale pink colour, of a soft velvet-like appearance, and covered constantly with a very thin transparent viscid mucus.

"Immediately beneath the *mucous coat* (?) and apparently incorporated with the villous membrane, appear small, spheroidal, or oval-shaped, glandular bodies, from which the mucous fluid appears to be secreted."

If the mucus covering the inner coat of the stomach be wiped off with a sponge during the period of chymification, the mucous membrane appears roughish, and at first, of a deep pink colour, but in a few seconds the follicles and fine papillæ begin to pour out their respective fluids, which being diffused over the parts from which the mucus had been removed, restore to them their peculiar soft, velvet-like appearance and pale pink colour, and the gastric juice begins to trickle down the sides of the stomach. When the mucus is wiped off during the period the stomach is empty, a similar roughness and deepened colour are produced, though in a less degree. The follicles appear to swell more gradually, and the fluids are not secreted in sufficient quantity to trickle down, as during the period of chymification.*

* Dr. Beaumont speaks of wiping off the mucous coat or *membrane* of the stomach, (page 107,) and of the mucous *coat* being restored, (ibid.;) these are

When the tongue is applied to the mucous coat of the stomach in the empty, unirritated state of the organ, no acid taste is perceptible, but whenever food or any other irritant is applied to the membrane so as to excite the gastric papillæ, an acid taste is immediately perceptible.

The ordinary temperature of the interior of the stomach during health Dr. B. has ascertained to be about 100° Fahr., as well in the intervals as during the process of digestion. There would appear, however, to be some difference in the temperature of different regions of the organ, it being somewhat higher at the pyloric than at the cardiac extremity. Variations in the state of the atmosphere were found in some of Dr. B's experiments, to affect the temperature of the stomach; a dry state of the atmosphere increasing, and a humid one diminishing it. Active exercise also was found to elevate invariably the temperature of the stomach, under all circumstances, about one and a half degrees.

When a portion of food is received into the stomach, the action of the vessels of its mucous coat become increased, the latter acquires a brighter red colour, the vermicular motions of the organ are excited, and the secretion of the gastric juice commences.

The latter appears to issue "from innumerable vessels, distinct and separate from the mucous follicles. These vessels, when examined with a microscope, appear in the shape of small lucid points, or very fine papillæ, situated in the interstices of the follicles." The gastric fluid, according to the observations of the author, is secreted in quantities exactly proportioned to the amount, and greater or less degree of solubility of the food admitted into the stomach, excepting when more is eaten than is necessary for the wants of the system. The fluid is either absorbed by the portion of aliment in contact with the coats of the organ, or collects in small drops, and trickles down the sides of the stomach, to the more depending parts, and there mingles with the food or whatever else the stomach contains.

"In febrile diathesis, or predisposition from whatever cause—obstructed perspiration, undue excitement by stimulating liquors, overloading the stomach

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certainly only loose modes of expression; he cannot possibly have confounded the mucous tissue of the stomach with the mucus by which it is covered; and yet we might infer this from his language, especially when he speaks constantly of a villous coat independently of the mucous coat. We have marked in numerous parts of the work expressions in the highest degree inaccurate: thus, he speaks of "*nervous* or vascular papillæ" secreting the gastric juice, (pp. 103–4,) of glands constituting a part of "the erectile tissue of the stomach," (p. 58,) and of the "excretory ducts of the gastric vessels," (p. 104.)

with food—fear, anger, or whatever depresses or disturbs the nervous system, the villous coat becomes sometimes red and dry, at other times pale and moist, and loses its smooth and healthy appearance—the secretions become vitiated, greatly diminished, or entirely suppressed—the mucous coat (?) scarcely perceptible, the follicles flat and flaccid, with secretions insufficient to protect the vascular and nervous papillæ from irritation.

"There are sometimes found on the internal coat of the stomach, eruptions, or deep red pimples, not numerous, but distributed here and there upon the villous membrane, rising above the surface of the mucous coat. (?) These are at first sharp-pointed and red, but frequently become filled with white purulent matter. At other times irregular circumscribed, red patches, varying in size or extent from half an inch to an inch and a half in circumference, are found on the internal coat. These appear to be the effect of congestion in the minute blood-vessels of the stomach. There are also seen at times, small aphthous crusts in connection with these red patches. Abrasions of the lining membrane, like the rolling up of the mucous coat (?) into small shreds or strings, leaving the papillæ bare, for an indefinite space, is not an uncommon appearance.

"These diseased appearances, when very slight, do not always affect essentially the gastric apparatus (?) when considerable, and particularly when there are corresponding symptoms of disease, as dryness of the mouth, thirst, accelerated pulse, &c. no gastric juice can be extracted, not even on the application of alimentary stimulus. Drinks received, are immediately absorbed, or otherwise disposed of; none remaining in the stomach ten minutes after being swallowed. Food taken in this condition of the stomach, remains undigested for twenty-four or forty-eight hours, or more, increasing the derangement of the whole alimentary canal, and aggravating the general symptoms of disease."

Dr. B. has observed that when a portion of food is received into the stomach, the rugæ of the latter gently close upon it, and, if sufficiently fluid, gradually diffuse it through the cavity of the organ, entirely excluding more during this action. The contraction ceasing, another quantity of food will be received in the same manner. It was found that when the valvular portion of the stomach in the subject of his experiments was depressed, and solid food introduced, either in entire pieces or finely divided, the same gentle contraction or grasping motion took place, and continued for fifty or eighty seconds, and would not allow of the introduction of another quantity until that period had elapsed, when the valve could be again depressed and more food put in. When the subject was so placed that the cardia could be seen, and then allowed to swallow a mouthful of food, the same contraction of the stomach and grasping of the bolus was invariably observed to commence at the œsophageal ring. Hence, when food is swallowed too rapidly, irregular contractions of the muscular fibres of the œsophagus and stomach are produced, the vermicular motions of the rugæ are disturbed, and the regular process of digestion is interrupted.

Contrary to the opinions of many physiologists, Dr. B. has ascertained that the solution of the food commences immediately after it is received into the stomach. Water, alcohol, and other fluids not containing alimentary matter in solution, pass from the stomach very soon after they are received, either by absorption or through the pylorus. Liquid albumen and albuminous fluids are first coagulated, and then dissolved by the gastric juice. Food taken in a liquid form combined with a large quantity of water, as soup, &c. is deprived by absorption of its aqueous portion before its digestion is commenced.

According to Dr. Wilson Philip, and the fact is confirmed by the experiments of Brodie, Broughton, Breschet, Edwards, and others, the digestion of the food commences first in the portion immediately in contact with the surface of the stomach, and as the thin layer of chyme there formed is removed by the muscular action of the organ, a second layer is chymified—digestion always commencing on the surface of the food. In reference to this opinion, Dr. Beaumont remarks:—

"That chymification commences on the surface of the food I have no doubt; but I apprehend this to be the case as it respects each individual portion, and not the whole mass.

"When a due and moderate supply of food has been received, it is probable that the whole quantity of gastric juice for its complete solution, is secreted, and mixed with it in a short time. If a tenacious mass of food be used, the external portion of the whole quantity is first acted on, digested, and succeeding portions presented, &c. From numerous examinations of the stomach, I feel warranted in saying, at least in the human subject, that there is a perfect admixture of gastric juice and food—that the particles of food are constantly changing their relations with each other."

We would inquire, however, of Dr. Beaumont, whether he has ascertained positively that contact of the food with the coats of the stomach is not essential to its perfect digestion? The whole mass of food contained in the stomach may be pervaded by the gastric juice and solution go on equally in every part of it, but the question is, does a single particle become converted into perfect chyme that has not come in contact with the parietes of the digestive organ, so as to enable the absorbents of the latter to act upon it? From a careful consideration of all the phenomena of digestion, we feel no hesitation in asserting as our opinion, that chymification, strictly speaking, invariably takes place in that portion of the aliment which is applied to the inner surface of the stomach, and that it can take place no where else. It will not do for Dr. B. to reply that he has produced chyme by the action of the gastric juice on aliment out of the stomach, he must first show by a chemical analysis that the fully formed chyme as it passes into the duodenum, and the food after its solu-

tion, merely, by the gastric juice, are identically the same—and this he has not even attempted to do. That the absorbents of the stomach do act upon the aliment is proved by the fact, that a chylous fluid is formed by these vessels as well as by those of the intestines. This is shown by the experiments of Leuret and Lassaigne, and more recently by those of Voisin.

Dr. Beaumont having observed a large proportion of fluid in the stomach, even after a dry and solid meal had been eaten, presumes that a synthetic formation of water from its elements takes place in that organ. We need only remark that the supposition is in the highest degree improbable; whatever amount of fluid may be poured into the stomach during digestion, we have no right to refer it to any other source than the exhalants of the mucous membrane.

The stomach is not quiescent during the process of chymification. By the alternate contraction and relaxation of its transverse muscular fibres a peristaltic motion is produced, which commences soon after the food is received, and causes the latter to revolve around the interior of the gastric cavity, from point to point and from one extremity to another.

"The ordinary course and direction of the revolutions of the food," according to our author's observations, "are first, after passing the œsophageal ring, from right to left, along the small arch; thence, through the large curvature, from left to right. The bolus as it enters the cardia turns to the left, descends into the splenic extremity, and follows the great curvature towards the pyloric end. It then returns, in the course of the smaller curvature, to perform similar revolutions."

These revolutions are completed in from one to three minutes. They are, however, slower at first than after chymification has considerably advanced.

The motions of the stomach not only produce the revolutions of the food just referred to, but, by a kind of agitation or *churning* of the contents of the organ, cause the particles of the aliment to be separated from each other and intimately mixed with the gastric fluids.

"There is nothing," remarks Dr. B. "of the distinct lines of separation between the old and new food, and a peculiar central or peripheral situation of crude as distinguished from chymified aliment, said to have been observed by Philip, Magendie, and others in their experiments on dogs and rabbits, to be seen in the human stomach; at least in that of the subject of these experiments. The whole contents of the stomach, until chymification be nearly complete, exhibit a heterogeneous mass of solids and fluids; hard and soft, coarse and fine, crude and chymified; all intimately mixed, and circulating promiscuously through the gastric cavity, like the mixed contents of a closed vessel, gently agitated or turned in the hand."

We suspect, however, that this commixture of the different contents of the stomach, noticed in the experiments of our author, must, in some measure, have been owing to the manner in which he extracted them for examination; namely, "by depressing the valve within the aperture, shaking a little, and pressing upwards." The firm compression which the stomach exerts upon its contents, would, of itself, be sufficient to force the more fluid portions to the surface, and unless some such separation does take place we cannot conceive how the digested food is carried off, by the muscular actions of the stomach, through the pylorus, while that which has not undergone the process of chymification is retained. On two occasions Dr. B. would seem to admit, that the digested and undigested portions of the aliment occupy different portions of the gastric cavity. Thus, at page 142:—

"It is possible," he remarks, "that the portion, (of aliment) presented at the perforation, may be in a more advanced stage of digestion than the rest of the mass, and consequently lighter, and float on the surface of the more solid portions of the food. In ordinary cases such would be found to be the case."

And again, at page 144:—

"It may be inferred from this experiment, (the 26th,) that the more perfectly chymified portions of food rise to the superior part of the stomach, as suggested in a preceding observation, and are consequently exposed at the perforation, from whence parcels are taken for experiment and examination."

According to Dr. Wilson Philip's observations, when food has been taken at different times, the new is never mixed with the old. Dr. Beaumont, however, conceives that this statement is not correct, but that in a very short time the food already in the stomach and that subsequently eaten become combined.

"One thing," he remarks, "is certain, and it is capable of demonstration in the stomach of the subject of these experiments, that old and new food, if they are in the same state of comminution, are readily and speedily mixed in the stomach."

The ordinary time required for the complete digestion of the food received into the stomach, during a healthy state of the organ, Dr. B. has ascertained to be about three hours and a half. The facility of digestion is modified, however, by many circumstances, as idiosyncrasies, habit, the nature of the food and the manner in which it is prepared. Minuteness of division of the aliment and tenderness of its fibre, would appear to be the two great essentials for its speedy and easy digestion.

"Albumen, if taken into the stomach, either very slightly or not at all coagulated, is perhaps as rapidly chymified as any article of diet we possess. If

perfectly formed into hard coagula by heat or otherwise, and swallowed in large solid pieces, it experiences a very protracted digestion. Fibrine and gelatine are affected in the same way. If tender and finely divided, they are disposed of readily; if in large and solid masses, digestion is proportionably retarded."

Animal fat is very quickly and invariably rendered fluid by the heat of the stomach, and, together with every species of oily food, resists for a long time the action of the digestive organ and its fluids. Dr. B. has observed that when the use of fat or oily food has been persevered in for a long time, there very generally takes place an admixture of bile with the gastric fluids, and from numerous experiments he has been led to believe that this admixture of bile has the effect of facilitating the solution of such kinds of aliment.

"Bulk is, perhaps, nearly as necessary to the articles of diet as the nutrient principle. They should be so managed that one should be in proportion to the other. Too highly nutritive diet is probably as fatal to the prolongation of life and health, as that which contains an insufficient quantity of nutriment."

Solid aliment Dr. B. has observed to be sooner disposed of by the stomach than fluid; he conceives, also, that its nutritive principles are sooner carried into the circulation. The correctness of the latter proposition is however very doubtful; the very fact, admitted by the author, that exhaustion from abstinence, namely, is more quickly removed by liquid than by solid food, would certainly seem to disprove it.

An incipient state of putrefaction, sufficient to render the muscular fibre slightly tender, was found to increase the digestibility of most kinds of flesh.

Vegetable aliment, generally speaking, he discovered to be slower and more difficult of digestion than animal. Its solution in the stomach is greatly influenced, however, by division and tenderness of fibre. Crude vegetables often pass through the pylorus in an undigested state, while other food is retained and fully digested.

The thorough mastication of the food is essential to healthy digestion.

"If aliment," remarks the author, "in large masses be introduced into the stomach, though the gastric juice may act upon its surface, chymification will proceed so slowly, that other changes will be likely to commence in its substance before it will become completely dissolved. Besides, the stomach will not retain undigested masses for a long time without suffering great disturbance."

Consequently, eating too fast impedes digestion, by introducing food into the stomach in a state unprepared for the actions of that organ and of its fluids. If food, also, be swallowed too rapidly more

will in general be taken into the stomach, before the sense of hunger is allayed, than can be digested with ease.

Overloading the stomach with aliment was invariably found to interfere with the regular process of chymification; a portion remaining for a long time undigested. This very soon becomes rancid or runs into acetous fermentation, and if not rejected by vomiting, causes pain and irritation of the stomach and other distressing symptoms; or it is permitted to pass into the intestines, where its presence almost invariably gives rise to colic, flatulence, or even more dangerous affections.

The reason why too large an amount of food is injurious, is supposed by our author to be, because "the quantity of gastric juice, either contained in its proper vessels, or in a state of preparation in the circulating fluids, is believed to be in *exact proportion* to the proper quantity of aliment required for the due supply of the system." Hence, if more food than is necessary be taken, a part of it must consequently remain undigested. We have nó evidence, however, that the solvent fluid secreted by the stomach is furnished only in a certain amount; it appears to us more probable, that when too large a quantity of food is eaten, it causes an undue distention of the stomach, and in this manner prevents its regular and healthy actions from going on: while, at the same time, most generally the food is swallowed faster than the gastric juice is secreted, and in a state unfitted to be acted upon by it.

Condiments, according to our author, though they may at first excite the action of a debilitated stomach, yet when used habitually, never fail to produce indirect debility of that organ, and in this manner impede digestion.

"Salt and vinegar are exceptions, and are not obnoxious to this charge when used in moderation. They both assist digestion—vinegar, by rendering muscular fibre more tender—and both, by producing *a fluid having some analogy to the gastric juice.*"

Alcoholic, and Dr. B. thinks probably all artificial drinks, impede more or less the digestive process; some more so than others; "but none can claim exemption from the general charge. Even coffee and tea, the common beverages of all classes of people, have a tendency to debilitate the digestive organs." In the correctness of these opinions we most heartily and fully concur.

Our author has found, from numerous trials, that moderate exercise, so far from interrupting digestion, conduces greatly to its healthy and rapid performance. Severe and fatiguing exercise, however, always retards digestion.

It is stated by most physiologists, that during digestion the stomach becomes a centre of fluxion; but against the use of such an expression Dr. Beaumont strongly objects; it being one, as he declares, to which no definite meaning can be attached. We confess that we were somewhat surprised at this assertion; we have repeatedly employed the same expression ourselves, and really did believe that we were conveying to all our readers who were any way conversant with medical language a definite idea; namely, that more blood is determined to the stomach during the period of digestion than when the functions of that organ are not in exercise. That the stomach really does become a centre of fluxion when digestion is going on, is proved by the observations which Dr. B. has himself recorded. He tells us, that, during digestion, the action of the vessels of the mucous membrane is increased, that the colour of the latter is of a brighter red, and that a very copious secretion takes place from its follicles and papillæ—that all this is occasioned by an irritation of the membrane resulting from the presence of the food; and further, that gentle exercises increases the circulation in the vessels of the stomach and the temperature of the latter, and in this manner facilitates digestion.

"As the food becomes more and more changed from its crude to its chymified state, the acidity of the gastric fluids is considerably increased; more so in vegetable than *in* animal diet; and the general contractile force of the muscles of the stomach is augmented in every direction; giving the contained fluids an impulse towards the pylorus.

"It is probable that from the very commencement of chymification—from the time that food is received into the stomach, until that organ becomes empty, portions of chyme are constantly passing into the duodenum, through the pyloric orifice, as the mass is presented at each successive revolution. I infer this from the fact, that the volume is constantly decreasing. This decrease of volume, however, is slow at first; but is rapidly accelerated towards the conclusion of digestion, when the whole mass becomes more or less chymified. This accelerated expulsion appears to be affected by a peculiar action of the transverse muscles, or rather of the *transverse band*, as described by Spallanzani, Haller, Cooper, Sir E. Home, and others, in their experiments on animals. This band is situated near the commencement of the more conical shaped part of the pyloric extremity, three or four inches from the smaller end. In attempting to pass a long glass thermometer tube through the aperture, into the pyloric portion of the stomach, during the latter stages of digestion, a forcible contraction is first perceived at this point, and the bulb is stopped. In a short time there is a gentle relaxation, when the bulb passes without difficulty, and appears to be drawn forcibly, for three or four inches, towards the pyloric end. It is then released, and forced back, or suffered to rise again; at the same time giving to the tube a circular, or rather spiral motion, and frequently revolving it completely over. These motions are distinctly indicated, and strongly felt, in holding the end of the tube between the thumb and finger; and it requires a

pretty forcible grasp to prevent it from slipping from the hand, and being drawn suddenly down to the pyloric extremity. When the tube is left to its own direction, at these periods of contraction, it is drawn in nearly its whole length, to the depth of ten inches; and when drawn back, requires considerable force, and gives to the fingers the sensation of a strong *suction* power, like drawing the piston from an exhausted tube. This ceases as soon as the relaxation occurs, and the tube rises again of its own accord three or four inches, when the bulb seems to be obstructed from rising further; but if pulled up an inch or two through the stricture, it moves freely in all directions in the cardiac portions, and mostly inclines to the splenic extremity, though not disposed to make its exit at the aperture. Above the contracting band, and towards the splenic portion of the stomach, the suction or grasping motion is not perceptible; but when the bulb is pushed down to this point, it is distinctly felt to be grasped, and confined in its movements. These peculiar motions and contractions continue until the stomach is perfectly empty, and not a particle of food or chyme remains, when all becomes quiescent again.

"If the bulb of the thermometer be suffered to be drawn down to the pyloric extremity, and detained there for a short time, or if the experiment be too frequently repeated, it causes severe distress, and a sensation like cramp or spasm, which ceases on withdrawing the tube, but leaves a sense of soreness and tenderness at the pit of the stomach.

"These peculiar contractions and relaxations succeed each other at irregular intervals, of from two to four or five minutes. Simultaneously with the contractions, there is a general shortening of the fibres of the stomach. This organ contracts upon itself in every direction, and its contents are compressed with great force. During the intervals of relaxation, the rugæ perform their vermicular motions, and the undulatory motions of the fluids continue.

From the foregoing facts, Dr. B. draws the following conclusions; namely, that—

"The longitudinal muscles of the whole stomach, with the assistance of the transverse ones of the splenic and central portions, carry the contents into the pyloric extremity. The circular or transverse muscles contract progressively from left to right. When the impulse arrives at the *transverse band*, this is excited to a more forcible contraction, and closing upon the alimentary matter and fluids contained in the pyloric end, prevents their regurgitation. The muscles of the pyloric end now contracting upon the contents deposited there, separate and expel some portion of the chyme. After the contractile impulse is carried to the pyloric extremity, the circular band and all the transverse muscles become relaxed, and a contraction commences in a reversed direction from right to left, and carries the remaining contents again to the splenic extremity, to undergo similar revolutions."

"After the expulsion of the last particles of chyme, the stomach becomes quiescent, and no more (gastric) juice is secreted, until a fresh supply of food is presented for its action, or some other mechanical irritation is applied to the internal coat (of the organ.)"

We have inserted the preceding quotations, notwithstanding their

length, in consequence of the highly interesting view which they present of the muscular actions of the stomach during digestion. The opportunity which the author enjoyed for studying them with care, precludes any doubt as to the correctness of his observations.

We come next to the consideration of a very important question; what, namely, are the changes produced in the food by the process of chymification? That solid food is dissolved in the stomach, we have now most abundant proof, and that most kinds of aliment undergo other and still more important changes, we have very strong reasons for presuming. But whether these changes consist merely in the breaking up of the union which existed between the proximate principles of the food, in the separation of such as are adapted for the formation of chyle from the recrementitious particles, or in an actual alteration in its chemical composition, are questions which still remain undecided. Not the least information in relation to them can be gleaned from the experiments and observations under review.

Chyme, or the product of stomachic digestion, is generally described to be a homogeneous, grayish paste, of a slightly acid taste; its acidity was found by Tiedemann and Gmelin to be greatest when the food is the most difficult of digestion. According to the observations of Dr. B. in its homogeneous appearance the chyme is invariable, but not in its colour, this being affected in a slight degree by the kind of food from which it is produced.

"It is always," he remarks, "of a lightish or grayish colour, varying in its shades and appearance from that of cream to a grayish or dark-coloured gruel. It is also more consistent at one time than at another; modified in this respect by the kind of diet used. This circumstance, however, does not affect its homogeneous character. A rich and consistent quantity is all alike, and of the same quality. A poorer and thinner portion is equally uniform in its appearance. Chyme from butter, fat meats, oil, &c. resembles rich cream. That from farinaceous and vegetable diet has more the appearance of gruel.—It is invariably distinctly acid, and possesses properties different from the elements of which it is composed."

A series of microscopic examinations of the chyme are furnished by the author; they lead, however, to no satisfactory conclusions in regard to its real character and composition.

It will, no doubt, be anxiously inquired, whether, by the experiments and observations of Dr. Beaumont, all the agents concerned in the process of digestion have been determined? To this inquiry, the reply must be in the negative. Excepting so far as relates to the

solvent powers merely of the gastric juice, they leave every thing in relation to the efficient cause of digestion in the same doubt and obscurity in which it was previously involved. Dr. B. it is true, infers from the result of his experiments, that the gastric fluid is the sole agent by which the food is converted into chyme; but until he shall be able to prove that fully-formed chyme, in the state in which it passes into the duodenum, and the fluid mass which results from the action of the gastric juice alone upon the food, are in all respects identically the same, and that the absorbents of the stomach do not act upon the dissolved aliment presented to their orifices, we must be permitted to consider his opinion in regard to the uses of the gastric juice as a mere hypothesis, the facts in support of which are still to be made out. Even the proposition with which the work before us closes, namely, "that *no other* fluid produces the same effect on food that gastric juice does, and that it is the *only solvent* of *aliment*," he is very far from having established. Tiedemann and Gmelin, as well as Leuret and Lassaigne, maintain, as the result of their experiments, that the mucus of the intestines possesses equally with the gastric juice the power of dissolving the food and converting it into a substance similar to chyme, and the fact is supported by the later observations of Voisin. The latter gentleman relates a number of experiments which prove that the gastric juice is not essential to the perfect digestion of alimentary substances. Of these experiments we present the following summary:—1st. Food triturated and mixed with saliva, when introduced into the small intestines of an animal, was in two or three hours as completely chymified as though the process had been performed in the stomach. 2d. Food of a moderate consistence, without any preparation, introduced into the upper portion of the small intestine of an animal, the communication between the intestine and stomach being cut off by the passage of a ligature, became perfectly chymified. Chyle as well as fæces were also formed. A dog was nourished in this manner for a month, and then killed. 3d. Food introduced into the cœcum, the ileo-cœcal valve being closed by a ligature, was, at the end of four hours, found to be sensibly changed, and presented some of the characters of chyme.

The fact is, the absorbents of the stomach and alimentary canal generally, perform a much more important part in the process of digestion than is commonly supposed. Doubtless the saliva, the gastric fluids, and even the bile and pancreatic juice, all, under ordinary circumstances, facilitate in a very great degree the conversion of the food into chyme and the formation of chyle; but to no one nor to all

of them are we inclined to ascribe any further agency in the process of digestion.

A number of experiments were performed by Dr. B. to ascertain, if practicable, the effects produced by the bile and pancreatic juice, when added to chyme. These experiments are acknowledged by the author to be very imperfect, and to lead to no positive conclusions. In the general summary, nevertheless, of the inferences which he conceives to be deducible from his experiments and observations is the following, namely, "that chyme is formed in the duodenum and small intestines, by the action of bile and pancreatic juice on the chyme." It is hardly necessary for us to enter into a refutation of this assertion. No physiologist, so far as we are aware, states that he has ever *seen* chyle in any part of the cavity of the intestines, while many, after performing numerous experiments to determine the fact, have declared that chyle never exists out of the lacteals, a conclusion which is now almost universally adopted. That the bile and pancreatic juice, particularly the former, are not by any means essential to the formation of chyle is conclusively established by the facts adduced by the German and French experimenters so frequently alluded to in this review, and which, likewise, very clearly point out the manner in which Brodie and Mayo were led into the erroneous conclusion that when the choledochus duct is tied in animals no trace of chyle can be detected in the lacteals. The recent experiments of Voisin prove, also, that chyle is formed notwithstanding the obliteration of the common duct of the liver and gall-bladder. With these remarks, we take our leave of this portion of Dr. Beaumont's work.

Before concluding, we have a remark or two to make in reference to our author's explanation of the cause of hunger. Dr. B. maintains, that the quantity of gastric juice necessary for the solution of just so much food as is required for the due support of the system is prepared during the intervals of digestion, and, just before a meal, fills and distends its proper vessels, ready to be poured into the stomach the moment food is swallowed; and that the sensation of hunger is produced by this distention or repletion of the secernent vessels of the stomach by the gastric fluid.

We might reply to this hypothesis by asking the author for the evidence by which the correctness of his premises is established. Is it established satisfactorily, that the gastric juice is secreted previously to the stimulus of food being applied to the coats of the stomach, and only in a certain definite amount? Or can it be proved that a distention of the "gastric vessels," as Dr. B. terms them,

does really exist whenever the sensation of hunger is experienced, and that the intensity of the latter is in exact proportion to the degree in which these vessels are loaded with the solvent fluid? We shall certainly be excused if we refuse our assent to the author's explanation of the cause of hunger, until the above points are clearly made out. But in the absence of any fact which bears directly upon them, we conceive that from the author's own experiments the incorrectness of his views in this particular may be shown. 1st. If there is in fact an exact relation between the quantity of the gastric juice in its proper vessels, and the quantity of aliment demanded by the wants of the system, how is it possible that the subject of our author's experiments could take into his stomach a full meal, a very short time after Dr. B. had drawn off one or two ounces of the juice, and yet digestion be regularly and promptly performed without being in the least affected by the loss of so considerable a portion of the proper solvent fluid. 2dly. If hunger depend upon the distention of certain vessels of the stomach by the gastric juice, how comes it that an hour or two before the least sensation of hunger was experienced, the author was able to draw off a large amount of gastric juice from the stomach, without the appetite of the patient being prevented from occurring at his regular meal-time, while in other instances, immediately preceding a meal a very small quantity of the juice was with difficulty procured, and yet the usual amount of food being taken immediately afterwards, its digestion was effected without the slightest unusual delay or difficulty. 3dly. How does the author's theory of the cause of hunger comport with the following fact. In experiment 64, page 207; three drachms of gastric juice were extracted from the stomach, and in fifteen minutes afterwards the young man ate four ounces of pure gelatine prepared with boiling water, which was almost entirely digested at the end of an hour, when a breakfast of pork and bread was taken with the usual degree of appetite. Thus, notwithstanding the unloading of the distended vessels by the extraction of three drachms of gastric juice, and by that which was poured into the stomach to dissolve four ounces of gelatine, it appears that the ordinary natural appetite of the subject was in no degree destroyed.

In many persons appetite for food is destroyed by allowing the usual period of a meal to pass by without eating, and in most individuals it is almost instantly dissipated, and even the food already taken prevented from being digested, by sudden emotions of the mind, disgust and other sensations. These facts, it is true, may be explain-

ed in conformity with the views advanced by our author, by supposing an immediate absorption, in such instances, of the gastric juice distending the vessels, and a suspension for a time of its further secretion; but we have no evidence either that distention of the gastric vessels or absorption of the gastric juice contained in them takes place. If we were to presume that distention of the gastric vessels produces the sensation of hunger, and that when aliment is not taken into the stomach at regular periods the gastric juice is absorbed, prolonged abstinence, whatever effects it may produce upon the system, should never give rise to that craving for food, that extreme hunger, which we know is the most tormenting phenomenon by which it is attended.

There are many other points embraced in the work before us which we should like to have noticed, had our limits permitted, but we must now draw our remarks rapidly to a close.

We have presented, so far as we were able in the space allotted to this review, a clear, and we trust satisfactory, view of the labours and opinions of the author. We have acknowledged the importance of the facts established by his experiments and observations, and given him credit for the perfect candour with which his opinions have been formed; we have taken the liberty, however, to dissent from the latter whenever we believed them to be unsupported by sufficient evidence, or in opposition to the facts already in our possession.

The experiments and observations of Dr. Beaumont cannot fail to be favourably received by the members of the profession, as affording, in very many particulars, a valuable addition to their knowledge of the physiology of certainly one of the most important organs of the animal system, and as a means of facilitating the inquiries of future experimenters into the true nature and cause of chymification.

In the event of a second edition, which will no doubt be speedily called for, a careful revision of his text will enable the author to remove those inaccuracies and obscurities of style with which the present is replete. D. F. C.

ART. XIV. *On the Influence of Physical Agents on Life.* By W. F. EDWARDS, M. D., F. R. S., Member of the Royal Academy of Sciences, and Royal Academy of Medicine of Paris, of the Philomathic Society of the same city, and of the Medical Society of Dublin, &c. Translated from the French, by Dr. HODGKIN and Dr. FISHER. To which are added, in the Appendix, *Some Observations on Electricity*, by Dr. EDWARDS, M. POUILLET, and LUKE HOWARD, F. R. S.; *On Absorption, and the Uses of the Spleen*, by Dr. HODGKIN; *On the Microscopic Characters of the Animal Tissues and Fluids*, by J. J. LISTER, F. R. S. and Dr. HODGKIN; and *Some Notes to the work of Dr. Edwards.* London, 1832. 8vo. pp. 488.

THE original of the valuable work before us was given to the world many years ago, but being composed in a foreign tongue, the important experiments and deductions which it contains were communicated but partially through the journals of the period, and as every page teems with useful and interesting information a small portion only of its contents could be laid before the profession in that way. Drs. HODGKIN and FISHER have consequently rendered a real service to the profession, by the publication of an English version. Many of the chapters were read at different times to the Academy of Sciences of Paris, and obtained for Dr. EDWARDS, who is an Englishman by birth, but was educated in Paris, and has resided there for the greater part of his life, the honourable distinction of the physiological prize.

"It is certainly to be regretted," says Dr. Hodgkin, "that our philosophical countryman has not himself exhibited his instructive work in an English dress, that our medical literature might have the credit of possessing it as an original rather than as a translation. Translations are generally inferior to original publications. In the present instance I have endeavoured to reduce the weight of this objection by submitting the translation to the author's perusal, and he has kindly supplied me with some fresh matter, which will be found in the Appendix. Whilst I feel justified in expressing myself as I have done with respect to the original work, to which I have to acknowledge the obligation of much important assistance in practice, I must confess myself very differently circumstanced with regard to the translation.

"To suit the convenience of English students, who have in general neither time nor inclination for voluminous reading, Dr. Fisher and myself have laboured, as far as possible, to compress the work without omitting a single experiment or conclusion. This, however, has been no easy task, as Dr. Edwards's own method of exposing the subjects of which he treats is in general too con-

cise to admit of abbreviation, without incurring the risk of producing obscurity." Preface, p. vi.

As it is not probable that the work will be republished in this country, we shall endeavour to lay before the reader such an analysis as may serve as a useful succedaneum; although it is impossible, in the space to which we must necessarily be confined, to embrace every important topic, and to elucidate it in the happy manner of the author. They, however, who seek for further information, will have to provide themselves with the work itself, which will amply repay them for the trifling outlay.

The work is divided into four parts, according to the animals experimented on:—1. *Batrachian reptiles.* 2. *Fishes and reptiles.* 3. *Warm-blooded animals:* and 4. *Man and vertebral animals.* The two last are obviously of more interest to us; but the deductions from all aid materially in solving the great problem of the influence of physical agents on animal life. We shall therefore briefly refer to the most prominent results contained in the two first parts, and dwell more at length on those classes which are more closely related to man, and on the phenomena presented by man himself.

I. *Batrachian reptiles.*—The first topic of inquiry in this class of the animated kingdom is into the phenomena of asphyxia; and especially, whether the medium, in which it may take place, has any peculiar influence independently of that which is exerted on the lungs. Of the media, the most important are air and water; and as reptiles have the power of living a considerable time after the heart has been removed from the body, the respective influence of these media can be readily appreciated. By the removal of the heart, the circulatory and respiratory functions are annihilated; the nervous and muscular systems are alone left, and these are inseparably connected. Now, by placing reptiles, whose hearts had been removed, in air and in water, and observing how long they continued to live, a comparison could be drawn of the influence of these media on the nervous and muscular systems, independently of that which they exert on circulation and respiration. This experiment was performed on salamanders, frogs, and toads.

Two salamanders, deprived of their hearts, were placed in water of the same temperature, which had been deprived of air by boiling; and two in air. One of the former died in eight hours, the other in nine; whilst those in air lived from twenty-four to twenty-six hours. The experiments were repeated with similar results; whence Dr. Edwards infers, that air, in comparison with water, has a superior vivifying in-

fluence upon the system of those animals, independently of its action by means of circulation and respiration.

Similar experiments on frogs furnished analogous results. Those in water lived two hours, those in air three.

"If a frog, thus deprived of its heart, and immersed in water, be drawn out, and exposed to the air, at the moment when all signs of life have disappeared, it immediately begins to recover. If it be again plunged in water, all appearance of life instantly ceases; and it may thus be made, several times alternately, to lose and recover its motion and sensibility." "This," adds the author, "confirms, in a striking manner, the vivifying effect of air, and the deleterious influence of water on the nervous system." p. 10.

It is more probable, however, that the effect is exerted on the contractility of the muscular fibre. Nasse has shown that water has the effect of destroying the irritability of muscles; and Dr. John K. Mitchell found, that when water was thrown into the heart of a *Testudo serpentaria*, or *snapper*, it was strongly stimulated, but its substance looked pale and hydropic, and in one minute action was destroyed beyond recovery.

In these experiments, the functions of the nervous and muscular systems alone remained; but in ordinary asphyxia, circulation continues in those animals, although respiration has necessarily ceased.

M. Edwards now attempted to ascertain the comparative duration of life in frogs whose hearts had been cut out, and in those in which they were left untouched. By placing these in water deprived of air, the latter in some instances lived twenty hours longer than the former; so that even the circulation of venous blood is favourable to the action of the nervous and vascular systems. This is strikingly illustrated in cholera, in which the activity of the nervous system, and its power over the muscles, were exemplified after nothing but dark blood was circulating in the vessels.

An interesting experiment was now made by strangling a number of frogs, by means of a ligature passed round the neck. At first they were paralyzed, but they afterwards recovered to a great degree, and lived from one to five days. The resistance to the ordinary sources of death, in the case of the amphibia, is most singular. Here we have them subsisting for days, although strangled; and Dumeril had a salamander which survived decapitation long enough for the wound to cicatrize.

It would seem, then, from the experiments of Dr. Edwards, that the batrachian reptiles can live for many days by the aeration of the

blood which is effected through the skin, and by the action of the air on the nerves distributed to the cutaneous envelope.

That the blood is acted upon by the air was satisfactorily proved by the quantity of carbonic acid exhaled from the surface of the body, when strangled frogs were placed in receivers containing atmospheric air—a fact clearly showing the existence of *cutaneous respiration* in them.

In a former number of this Journal* we referred to certain experiments that were instituted by Professor Buckland, connected with the well-known fact of the capability possessed by toads of living for a considerable length of time without air. Dr. Edwards is disposed to think, that in all the instances on record, of toads having been found imbedded in blocks of stone, there was probably some crevice, forming a communication between the external air, and the cavity containing the animal; but this, we think, is not proved. In the experiments of our author, he found that toads,—and the same remark applies to frogs and salamanders,—lived longer in sand or plaster than in air, owing, he conceives, and we think properly, to the cutaneous transpiration being more abundant in the air than in the solid substances, so that they exhaled, in the former case, the quantity of water that was necessary to their existence, and consequently expired.

In some of M. Edwards's experiments on the duration of the life of frogs inclosed in plaster, they did not survive more than six weeks; but Herissant affirms, that he kept them alive for eighteen months.

All the results of the experiments were materially modified by various circumstances, and one of the most important of these was the temperature of the medium in which the animal was placed. It was found, that as the temperature of the water of immersion was reduced, the duration of the life of the frogs was extended, until at 32° Fahrenheit, or the freezing point of water—it was more than tripled. On the other hand, the elevation of temperature caused a corresponding abbreviation of life, until, at 108° Fahrenheit, or about the natural temperature of warm-blooded animals, death was almost immediate.

"At the freezing point the animal did not become torpid, but it was less active; whilst the elevation of temperature aroused it to great agility." p. 17.

These results apply only to the asphyxiated animal. The frog, whose respiration is free, may live in warm climates in water at 108°.

It appears, too, that *season* has a manifest influence on the dura-

* For May, 1833, p. 133.

tion of life;—first, by the temperature of the water in which the animals are immersed; and secondly, by the influence of the temperature of the air for some days previous to the experiment; and when these circumstances are combined the effect is doubled.

"On the 23d Nov. 1817, the air and water being at 10° cent. or 50° Fahr. and the mean temperature of the month being nearly the same; five frogs were placed in water at the same degree. They lived from 5h. 10′ to 11h. 40′; the latter period being about double the duration of life of these animals in water at the same degree in summer. On the 22d Déc. the thermometer having been about 0° cent. or 32° Fahr. for twenty days, three frogs were put in water at 10° cent. or 50° Fahr.; they lived from twenty to twenty-four hours. On the 23d Dec. the temperature being still 0° cent. or 32° Fahr. four frogs were placed in water at 0° cent. or 32° Fahr. the same apparatus being employed as in the preceding experiments. They lived from twenty-four to sixty hours." p. 20.

In the last experiment, consequently, they were placed in circumstances the most favourable for the prolongation of life under water.

The adult batrachians have only lungs,—organs adapted exclusively for atmospheric respiration. It becomes an interesting question, therefore, to inquire how they are influenced by the air contained in water, and whether they are not compelled, both in summer and winter, to come to the surface to breathe. M. Bosc informed Dr. Edwards, that he has seen the frog, during the winter season, quit the water for several days in succession, at a certain hour, and take breath for a short time on land; and if this be necessary in winter, when the animal is less active, it must be still more so in summer.

To prove how far they are really influenced by the air contained in water, our author first tried the effects of limited quantities of water; and he found that frogs lived from three hours and forty minutes to five hours and thirty minutes in boiled water, whilst others, in aerated water of the same temperature, lived from six hours and forty-three minutes to ten hours and forty minutes;—results which showed that the air in the water has a decided influence in prolonging the life of these animals within certain limits.

Another experiment proved most satisfactorily that frogs are truly amphibious, or capable not only of breathing the air of the atmosphere, but also of living exclusively on the air contained in water. By daily renewing stagnant water, a male frog, secured at the bottom of a glass vessel, was kept alive for more than two months and a half. Tadpoles can live in water without coming to the surface. They have, however, gills as well as lungs, and hence resemble fishes. They differ from the frog in not being able to live on land previous to the full development of their limbs.

The air contained in the water does not seem to act through the medium of the lungs. Inspiration in frogs is performed by a kind of deglutition, and is accompanied by very evident movements of the throat. In the atmosphere, these movements are repeated thirty or forty times in a minute; but when the animal is plunged in water they cease, and are not repeated; and if the lungs of the frog be examined no water is found in them, even when the immersion has been prolonged. The air must consequently act on some other organ than the lungs; and the skin is the only other organ in contact with the fluid.

The experiments, previously referred to, having established the fact of cutaneous respiration in the batrachians, Dr. Edwards next attempted to discover, whether these animals could continue to live, if permitted to breathe by the lungs alone, the atmosphere being altogether excluded from contact with the skin; and he inferred from his experiments, that—

"Pulmonary respiration is not sufficient to support the life of tree frogs, without being accompanied by the atmospheric influence upon the skin. The case is the same with the *rana obstetricans*, on which the experiment was also tried, and we may conclude, that the observation applies to all the batrachians. p. 41.

The attention of Dr. Edwards was next directed to the influence of the atmosphere on the *perspiration* of those animals. This he found to depend greatly upon the condition of the animal as to saturation; and accordingly the loss by perspiration differs greatly; but, taking the animal at the point of saturation or fulness, it is found to lose less and less by perspiration in a given time, in proportion as it removes from this point.

The quantity lost was found to depend greatly on the state of the atmosphere, as to rest and motion: when the wind was strong, the perspiration was quadrupled. It was to be expected likewise, that it should differ according to the hygrometric state of the atmosphere. Air, saturated with moisture, did not seem to prevent perspiration altogether, although it reduced it to its minimum. We do not think, however, that Dr. Edwards's experiments on this point were altogether satisfactory. The animal was suspended in a glass vessel, inverted over water, in which it would by no means follow, that the air should be saturated with moisture. The function of transpiration being one of depuration, must of necessity go on whether the air is saturated or not. In dry air, the loss was from five to ten times greater than in air of extreme humidity, according to the degree of dryness and the duration of the experiment.

As to the relative influence of different degrees of temperature upon the quantity of perspiration, it was much less than was anticipated. During five hours, the quantity perspired at 68° Fahr. was scarcely twice what it was at 32° Fahr. and that at 104° Fahr. was seven times greater than at 32° Fahr.;—thus resembling the effects obtained from a dry and still, compared with a humid atmosphere.

Another important topic of inquiry was, how the weight of the body is influenced by the contact of water with its external surface? That water was absorbed was manifest, and the weight of the body was found to increase or diminish, according as either of the antagonist functions of absorption and transudation exceeded the other. At 32° Fahr. the absorption predominated; at 86° the transpiration. Thus much, as regards the batrachian reptiles.

II. *Fishes and reptiles.*—The first stage of the life of batrachian reptiles, or the tadpole state, is so peculiar as to have induced the author to consider it under this head. The chief peculiarity consists in their possessing two kinds of respiratory organs—lungs and gills.

"Tadpoles unite in regard to respiration, the functions of reptiles with those of fishes; their use of them varies, not only according to their development, but also according to their physical conditions, under the influence of which we are now about to consider them. The tadpole has, in common with the adult animal, the power of supporting life through the medium of the skin, by means of the air contained in water. It has already been shown, that the limits of temperature in which the adult animals are able to exist, are 32° and 50° Fahr. or 0° and 10° cent.; and that beyond the higher limit, the greater part were obliged to have recourse to atmospheric respiration; but tadpoles, having an additional organ, by which they are enabled to avail themselves, in a higher degree, of the vivifying influence of the air contained in water, ought, we would imagine, to support, under water, a much greater elevation of temperature, without having recourse to the external air. That this is actually the case, is shown by experiments in which they were kept a long time in vessels with the water occasionally changed, and in running water, at the temperature of 25° Cent. or 77° Fahr." p. 52.

The most important of Dr. Edwards's inquiries was into the influence of physical agents on the transformation of the tadpole into the frog. This is known to be expedited by a due supply of nutritious matter, and to be retarded when the supply is scanty.

The effect of temperature is also signal. If the tadpole is produced late in the summer, the subsequent temperature not being sufficiently elevated, it passes the winter in the larva state, and does not quit it until the return of warm weather. The results of the experiments, instituted by our author, further showed, that if deprived of atmospheric respiration they would retain their original form under water,

if their nutriment were not too abundant, and the temperature were not too high; and that the difference of atmospheric respiration alone, joined to these circumstances, would determine the transformation. It will be seen afterwards, that privation of light has a great effect in retarding and modifying their development.

Experiments were made on *fishes* similar to those on the batrachian reptiles; and first, as regards the influence of temperature on their lives in water deprived of air. Comparative experiments were made on individuals of the same species, at temperatures varying from 32° Fahr. to 104°. The result was, that at the higher limit death was as speedy as in the case of the batrachians, and the duration of life was progressively greater in proportion as the temperature was reduced to the lower limit. It appeared, however, that the smaller and the younger the fish, the less capable was it of bearing an elevation of temperature. At 104° the small fish do not live more than two minutes, whilst the larger survive several minutes longer. These results only apply, however, to the case of fishes inhabiting water of the ordinary temperature of the climate. De Saussure, Sonnerat, Bruce, Abel, Lamarck, and others, sufficiently show, that these animals may breed, and live in water of a much more elevated temperature. Humboldt and Bonpland saw them thrown up alive fro the bottom of a volcano, the steam of which raised the thermometer to 210° Fahr.

His next inquiry was into the *influence of the temperature of aerated water in limited quantities in close vessels*, and from a number of experiments he deduced the following inferences; *first*, that the duration of life goes on increasing with an increase of the quantity of aerated water, the temperature remaining the same; *secondly*, that the same result takes place when, the quantity of water remaining the same, the temperature is lowered; and *thirdly*, that the duration of life remains the same, when, within certain limits, we increase or diminish at the same time both the temperature and the aerated water. p. 57.

The influence of temperature on fishes was found to resemble that on the batrachian reptiles. If a bleak *(Cyprinus alburnus)* be put into a vessel with a large mouth, containing five ounces and a half of aerated water, at 68° Fahr., in summer, it dies within a few hours; but when the temperature is lowered to 50° or 53° Fahr. and is kept at that point, the animal lives until its secretions are so abundant as to corrupt the water; and if the water be renewed every twenty-four hours, it lives in it almost indefinitely.

From all his experiments connected with this subject, the author

deduces, that the more the temperature is raised beyond certain limits, the greater is the degree of influence of the air required for their support.

The experiments of Sylvestre and others had sufficiently shown, that atmospheric respiration has an influence on the life of fishes—that it tends to prolong their existence in water. It became interesting, however, to examine into the circumstances connected with their life in the air. When a fish is taken from the water, it dies in a few minutes, or in a few hours, according to the species; and hence it has been inferred, that fishes are incapable of living by atmospheric respiration, or that air in this form is unfit for their continued existence. From a series of well-devised experiments, it was further shown—

"That the life of fishes in the atmosphere depends on several conditions, of which the principal are, temperature; the capacity of saturation with water; the corresponding loss by perspiration from the trunk and gills; the quickness of this loss; the action of the muscles which move the gills; and the use which they make of their muscles to avail themselves of the action of the air upon the gills. In short, they come under the general law relative to the influence of the atmosphere on the life of vertebrated animals. As fishes seem to form an exception to this law, I have thought it necessary to show that they are so only in appearance. What has been here stated relative to the life of fishes in the atmosphere, is equally applicable to tadpoles, placed in the same circumstances. They die from the quantity of water which they lose by perspiration; and although their capacity of saturation is, at least, equal to that of frogs, since it varies between one-third and one-fourth of their weight, yet as their size is very small, and their perspiration rapid, on account of the delicacy of their skin, they soon lose that proportion of water, and in the experiments which I made, I found that they did not live more than four hours." p. 64.

Similar experiments were made on lizards, serpents, and tortoises; in other words, on the saurian, ophidian, and chelonian reptiles, which showed, that as regards the action of the atmosphere, the general results are the same with all cold-blooded animals: modified, however, by the character of the external covering, as respects its porosity and thickness.

III. *Warm-blooded animals.*—This and the following part are possessed of more interest to us than those to which we have attended, and are more calculated to aid us in determining many important topics of physiological and pathological inquiry. The first chapter is on the *heat of young animals.*

It has been a universal opinion, owing to the circulation of young animals being more rapid, and the function of nutrition more active, that their temperature is much higher than that of adults. The opinion is not sanctioned by observation. When new-born animals are

examined, the temperature, if placed near the mother, is never found to be superior to that of the adult. But if when the temperature is from 50° to 68° Fahr. a new-born puppy be removed, and kept an hour or two from its mother, the temperature falls considerably, and continues falling, until, in the course of three or four hours, it stops at a very few degrees above that of the surrounding air. The heat begins to subside as soon as the separation takes place, and the diminution is not in the least retarded by furnishing the animal, from time to time, with milk. So that it would appear, from these and other experiments, that the young animal, of certain species at least, produces less heat in a given time than the adult. As it advances in life, the diminution, under the circumstances mentioned, takes place more slowly, and to a less and less extent; until, at the end of a fortnight, it will maintain itself at a degree nearly equal to that of the parent. The new-born puppy would seem, consequently, to resemble the cold-blooded, rather than the warm-blooded animal, the characteristics of the latter being acquired gradually.

The same phenomena were found to take place with kittens and rabbits, but not with the young of all the mammalia—with the young Guinea-pig for example. The young of the mammalia seem, therefore, to be divided into two groups, in relation to animal heat; some being born, as it were, cold-blooded; others warm-blooded.

Now, corresponding to this difference, there appears to be another, deducible from the state of the eyes. Some are born with the eyes closed; others with them open; and until the eyes are opened they resemble the cold blooded-animal; those that are born with the eyes open being warm-blooded from birth.

"Thus," says Dr. Edwards, "the state of the eyes, though having no immediate connexion with the production of heat, may yet coincide with an internal structure influencing that function, and certainly furnishes signs which serve to indicate a remarkable change in this respect; since, at the period of the opening of their eyes, all young mammalia have nearly the same temperature as adults." p. 70.

Analogous results were obtained in the case of young birds,—the experiments being all admirably arranged, so as to prevent the existence of any source of fallacy,—but here again a difference was perceptible in different birds, some being, like the young Guinea-pigs, capable, as soon as they are extruded, of maintaining an elevated temperature, if exposed to the air in a favourable season. None, however, have the power of preserving their temperature, when the season is very severe, owing to the young possessing to an inferior degree the power of producing heat.

We may conclude, then, that the power of producing heat, in warm-blooded animals, is at its minimum at birth, and increases successively, according to our author, until adult age.

The singular phenomena of *torpidity*, which has engaged the attention of so many physiological naturalists of eminence, could not fail to attract that of Dr. Edwards. The hibernating animals—as the bat, hedgehog, dormouse, garden dormouse, and the marmot, possess all the characteristics of the mammalia, and are distinguished from the others only by their hibernation; during the existence of which they are converted, for the time, into cold-blooded animals;—their temperature being scarcely higher than that of the surrounding atmosphere; their respiratory movements irregular, feeble, and at long intervals; and no nourishment being taken during the whole period, which continues for several months.

The attention of observers—of Spallanzani, Hunter, Mangili, De Saissy, and others—has been principally bestowed on these animals during the period of hibernation; upon the mode of resuscitating them, as it were, and of again throwing them into torpidity. The researches of M. Edwards were directed chiefly to the phenomena connected with their temperature, which seem to influence all the others.

The spring and summer temperature of these animals has been found equal to that of many other mammalia, 98°.6 of Fahr.; but the following experiment of M. Edwards, essentially resembling some performed by M. De Saissy, shows that they produce less heat.

In April, 1819, the air being at 61° Fahr. an adult bat, of the long-eared species, recently taken, in good condition, and at the temperature of 93° Fahr. was placed in an earthen vessel, which was cooled by a mixture of ice and salt, till the air within was reduced to 33°.8 Fahr. The vessel had a cover, which allowed a free communication with the external air. After the animal had been there for an hour, its temperature was reduced to 57° F.;—a loss in this short space of time of 36° F. Guinea-pigs and adult birds, placed in the same circumstances, lost, at the utmost, not more than two or three degrees, although the influence of the cold was prolonged, in their case, to compensate for the difference of size.

Hence it appears, that bats produce less heat than animals which do not hibernate. To this cause must be ascribed the reduction of their temperature during the cold season; and it applies to all hibernating animals as well as to the bat.

From this inquiry the transition was natural to that,—whether in the opposite seasons of winter and summer, warm-blooded animals,

not hibernating, presented any difference in regard to their power of producing heat? This was to be ascertained by placing animals of the same species in the same conditions of refrigeration in winter and summer, and observing whether their temperature diminished unequally.

"It is necessary," says M. Edwards, "in the first place, that the animals selected should be as similar as possible, and that the experiments should be sufficiently numerous to obviate any considerable influence from individual diversities. In order that the mode of refrigeration should be the same, attention must be paid, not only to the temperature, but to the humidity of the atmosphere; for a difference in the hygrometric state of the air would produce a corresponding difference in the evaporation from the lungs and skin, and consequently in the quantity of heat lost.

"The apparatus consisted of glass vessels, of the capacity of two pints, placed in a freezing mixture of salt and ice. The air, thus cooled, is at its point of saturation with moisture. When it is at zero cent. or 32° Fahr. the animal is introduced, and placed on a false bottom of gauze, to prevent the contact of the cold glass. A lid covered with ice is placed over the vessel, but so as to permit change of air for the free exercise of respiration; and, in order more effectually to secure the purity of the air, a concentrated solution of caustic potass is placed at the bottom, to absorb the carbonic acid, which it readily does, through the gauze." p. 82.

The general results were as follows:—In the month of February the experiment was made, at the same time, upon five adult sparrows. In the course of an hour, they lost, on an average, 7°.2 Fahr., some having lost none; others only 1°.8 Fahr. Their temperature then remained stationary, until the end of the experiment, which lasted three hours. In July the same experiment was tried on four others. Their temperature, in the course of the first hour, sustained an average loss of 6°.5 Fahr.; at the end of the third hour the average reduction from their original temperature was 10° Fahr. In another series of experiments on six sparrows, in the month of August, the mean loss of temperature, at the end of the first hour, was 2°.9; and after three hours 8°.76:—experiments which would seem to show, that continued elevation of temperature diminishes the power of producing heat, whilst an opposite state of the atmosphere, provided the cold be not too severe, increases it.

The hope of producing such a change in animals as might enable them to support the privation of air for a much longer period than is natural to them, and to become aquatic animals, led Buffon to the discovery of a singular fact connected with young animals. He placed a greyhound bitch, of the large species, when on the point of giving birth to young, in a tub of warm water, and secured her in

such a manner that she was obliged to bring them forth under water. These were afterwards, for the sake of nourishment, transferred to a smaller tub of warm milk, but without giving them time to breathe. They remained there for above half an hour, after which they were taken out, and all found alive. They began to breathe, which they were permitted to do for half an hour, and were then again plunged in the milk, which had been warmed again in the mean time. There they remained for another half hour, and when they were again taken out, two were quite strong, and seemed not to have suffered at all. The third appeared drooping, but was carried to its mother, and soon recovered. The experiment was continued on the other two: they were allowed to breathe a second time for about an hour; and were then plunged once more in the warm milk for half an hour, after which they appeared as strong as before. Being taken to their mother, however, one of them died the same day, whether by accident, or from the privation of air, could not be ascertained. The other lived as well as the first; and both throve as well as the other puppies produced after the bitch was removed from the water, and which had not been experimented upon.

Some similar experiments were made by Le Gallois on rabbits, which would favour the belief, that the duration of the life of new-born mammalia, under such circumstances, is about half an hour. Yet M. Edwards was surprised to find, that the Guinea-pig, at birth, when plunged in water, lived only three or four minutes longer than the adult, and in other animal species the difference was not greater. On inquiring into the causes of this difference, he found that those animals which, when asphyxiated, give signs of life for half an hour, are the very species that possess feeble powers for the production of heat—new-born dogs, cats, and rabbits, for example. It was before observed, that these animals, at this period of existence, strongly resemble fishes, and these facts show that they resemble them further in the power of sustaining privation of air. On the other hand, Guinea-pigs are in the class that produce most heat at birth, and of these the author says he has never seen one which lived above seven minutes under water.

"We have seen," says M. Edwards, "that at the end of the fifth day the duration of life during asphyxia is reduced one-half: now this reduction corresponds to a sensible elevation of their temperature. The same is the case after the second interval of five days; the heat is then much increased, and the power of living without respiration is considerably diminished. Lastly, when they have arrived at the fifteenth day, a period when they usually have a temperature nearly equal to that of adults, they scarcely differ from them in the duration of

asphyxia. If, instead of passing at once from the first to the fifth day, we examine the young animals in the intervening days, we shall find, that during the first and second, and even not unfrequently the third, the duration of asphyxia is only very slightly altered. The production of heat corresponds with this, and both phenomena likewise concur in the more rapid and striking change that quickly after takes place.

"We see that the distinction formerly pointed out between young mammalia, founded in the production of heat, is applicable to them, also, in respect to the duration of life, when deprived of respiration. This duration has its maximum in the group of mammalia which produce the least heat at birth, and its minimum in those which produce the most." p. 88.

The external temperature has likewise an influence on the duration of asphyxia in these cases. Some kittens, when a day or two old, were subjected to water, cooled to 32° Fahr.; they ceased to give signs of sensibility and motion after four minutes and thirty-three seconds, taking the mean of nine experiments. At a temperature of 50° Fahr. the duration of life extended to ten minutes and twenty-three seconds; at 68°, to thirty-eight minutes and forty-five seconds. At 86°, however, they lived but twenty-nine minutes, and at 104°, but ten minutes and twenty-seven seconds;—so that there are two principal conditions which influence the life of warm-blooded animals when deprived of air; namely, the quantity of heat developed by the animals themselves, and the external temperature to which they are exposed.

In his experiments upon the respiration of this class of animals, M. Edwards found that the young are capable of living much longer than the adult in the same quantity of air; and consequently, that their consumption of the air in respiration is comparatively less. So that the adult animal, whose power of producing heat is great, consumes more air than the young animal, whose calorific powers are less. Here, again, a difference existed between Guinea-pigs and puppies. The latter were removed from the confined space at the end of four hours and fifty-nine minutes, the former after an hour and forty-two minutes. A recollection of the fact, that young puppies at birth produce much less heat than Guinea-pigs, will explain the apparent anomaly.

It was before remarked, that the power of producing heat in warm-blooded animals, is greater in winter than in summer; and the experiments of M. Edwards showed that the consumption of oxygen is more rapid in the former season.

The researches of our author on the *perspiration* or *exhalation* of warm-blooded animals, led him to the following results:—

"That the successive losses by perspiration are subject to considerable varia-

tions and alternations of increase and diminution, when compared at short intervals, but constantly decrease when considered at longer periods. The periods during which the fluctuations takes place in vertebrated animals generally, may be pretty accurately determined. We have always observed, in warm-blooded animals, the alterations to take place with intervals of an hour, and this term may be regarded as a general rule. On examining the whole series of experiments upon vertebrata of different classes, it was observed that the shortest intervals within which the successive diminution took place were those of two hours, and the longest, nine. In taking a mean of six, we may hope to include almost all the cases, for even when a longer space of time was necessary, three hours were sufficient to determine a diminution, if not constant, at least with little variation. In the greater number of cases, it took place in successive intervals of three hours." p. 105.

The main results were found to be conformable to those obtained on cold-blooded animals. In the former, however, the perspiration was found to be six times greater in dry than in moist air. The influence of air in motion, and air at rest, on the function of perspiration, was found to be analogous to that experienced in the cold-blooded animal.

IV. *Man and vertebrate animals.*—The effect of various physical influences on these upper classes of created beings are of most moment to us, although nothing can be more instructive to the scientific anthropologist than an investigation of similar influences on animals lower in the scale; from which, by invoking a wise analogy, inferences may be drawn that tend largely to elucidate many obscure phenomena presented by man himself.

"The results," says our author, "obtained in my experimental inquiries into the influence of physical agents on other warm-blooded animals have been so uniform, that they may, by analogy, be extended to man, although he can scarcely be made the subject of the experiments themselves, and for this reason was not mentioned in the preceding part." p. 112.

The first chapter of this division is *on the modifications of heat in man, from birth to adult age;* and here we observe, at once, the striking analogy to the warm-blooded animals in general. It was before stated, that those which are born with the eyes closed, lose their heat when they are exposed to the air in spring or summer, almost as rapidly as cold-blooded vertebral animals; whilst those whose eyes are open at birth, under similar circumstances, preserve a high and constant temperature. In accordance with analogy, a new-born infant, at the full period, having the eyes open, should have the power of maintaining a pretty uniform temperature during the warm seasons; but if birth takes place at the fifth or sixth month, the case

is altered; the pupil is generally covered with the *membrana pupillaris*, which places the animal in a condition similar to that of closure of the eyelids in other animals. Analogy would induce us to conclude, that in such an infant the power of producing heat would be inconsiderable. Observation confirms this; although we obviously have not the same facilities, as in the case of animals, of exposing the young to a depressed temperature. On taking the temperature of twenty adults, it was found to vary from 96° to 99° Fahr. the mean being 97°; whilst the temperature of ten healthy infants varied from 93° to 95° Fahr. the mean of the whole being 94°.55.

The temperature of a seven months' child, though well swathed, and near a good fire, was, within two or three hours after birth, no more than 89°.6 Fahr. Before the period at which this infant was born, the *membrana pupillaris* disappears; and it is probable, as Dr. Edwards has suggested, that if it had been born some time before the disappearance of the membrane, its power of producing heat would have been so feeble, that it would scarcely have differed from that of mammalia born with the eyes closed.

These facts suggest another most important object of inquiry, regarding the *influence of cold on mortality at different periods of life.* If the faculty of evolving heat differs, vitality will be correspondingly modified; and the temperature of the atmosphere has to be guarded against by proper precautions, especially where the capability of evolving heat is feeble.

Now, as this capability is less in the infant at birth than it is subsequently, it requires the assistance of external warmth more than it does subsequently, and it is probable that contact with the mother, so strongly suggested by the maternal feelings and instincts, is essential to the due maintenance of the vital energies.

The following experiments are full of interest in this point of view.

"On 12th February 1819, a kitten, newly littered, removed from its mother, and exposed to the air, at the temperature of 14° cent. or 51° Fahr. being cooled down in nine hours to 18° cent. or 64°.4 Fahr. became stiff, and almost incapable of executing the slightest movements.

"The following month the air of the room being 10° cent. or 50° Fahr., I exposed two kittens, of one day old, and having a temperature of 37° cent. 98°.6 Fahr. In 2h. 25, the temperature of one was reduced to 17° cent. or 62°.6 Fahr. and that of the other to 18° cent. or 64°.4 Fahr. They had become stiff and almost insensible.

"In the month of January in the same year, four puppies littered the day before, were of the temperature of 35° to 36° cent. or 95° to 97° Fahr. The air of the room was 11° cent. or 52° Fahr. The cooling which they underwent

from nine in the morning till ten at night, lowered their temperature to 13° and 14° cent. or 55°.4 and 57° Fahr. They were then so enfeebled that they were almost motionless.

"The symptoms of weakness and suffering soon after the young animals are exposed to the air, increases as their temperature sinks. The same circumstances occur with those young birds which produce the least warmth when hatched.

"Although the diminution of temperature thus occasioned by exposure to the air, would ultimately prove fatal to these young animals, it is remarkable how long they are capable of enduring a considerable reduction of temperature. New-born puppies or kittens may live two or three days at a temperature of 20° cent. or 68° Fahr. and even 17° or 18° cent. or 62°.6 or 64°.4 Fahr. But the air must not be too cold, or they would soon be deprived of sense and motion, and in a short time this apparent death would become real. When they appeared on the point of expiring, I easily restored animation by placing them before the fire or by immersion in a bath. These means, if promptly applied, may even prove effectual when they are quite motionless, and, to all appearance, dead." p. 119.

It appears, then, that these animals bear a considerable reduction of their temperature, but they must not be left too long in the state of reduction; and due care must be taken in the restoration of warmth. If the exposure be too often repeated, or too long continued, it is fatal; and the facility of recovery after great reduction of temperature, does not continue in the same degree in the progress of life. The reduction of bodily temperature is therefore less injurious in its permanent effects, in proportion to the youth of the animal.

It has been observed, that in young warm-blooded animals, the capability of supporting reductions of temperature is inversely proportionate to their power of producing heat, and this appears to be a wise provision of nature; for whatever care may be taken by parents of their young, they cannot always remain with them to maintain their temperature at a high degree, if they belong to the class of animals that are born with closed eyes, or without feathers.

"As soon as they leave them to provide subsistence, the temperature of their young begins to be reduced, and if this reduction were as injurious as it is to those animals which produce more heat, the greater part would perish." p. 121.

The following is a general review of the facts relative to the influence of cold at the different periods of life.

"We must distinguish two things—the cooling of the body, and the temperature capable of producing it. The cooling of the body, without regard to its cause, is less injurious in proportion to the youth of the animal. Lower the temperature of two animals of the same species an equal number of degrees, the young will suffer less, and will recover more perfectly. But, in order to lower the temperature of animals of different ages, different degrees of external

cold will be necessary, being lower, the nearer the animal is to adult age. If, on the other hand, young animals suffer less from the same reduction of warmth, on the other hand, they cool more readily. It is on this last circumstance, that the mortality in warm-blooded animals, at different periods of life from birth to adult age, principally depends, so far as it is the result of the influence of external cold." p. 122.

When the momentary application of cold is frequently repeated, the power of producing heat becomes enfeebled, and it takes some time for the organs of calorification to recover their power: on the other hand, after exposure to cold sufficient to diminish the power of producing heat, continuance in a high temperature tends to the recovery of this power, for on exposing animals to successive applications of cold, their temperature is found to fall the more slowly the longer they have been subjected to the influence of warmth. Hence, persons who are liable to frequent exposure to severe cold, are rendered more capable of supporting it, by subjecting themselves, in the intervals, to an elevated temperature. The transient application of heat consequently occasions effects, which are continued beyond the time of the application, and it operates whenever the system stands in need of heat.

The experiments of Le Gallois, as well as those instituted by himself, have induced M. Edwards to infer, that there is always a certain ratio between heat and respiration in both the cold-blooded and warm-blooded animals; and in hibernating animals both in the periods of torpidity, and of full vital activity. When the eighth pair of nerves is cut in the young of the mammalia, a considerable diminution is produced in the opening of the glottis, so that in puppies, recently born, or one or two days old, so little air enters the lungs, that when the experiment is made in ordinary circumstances, the animal perishes as quickly as if it was entirely deprived of air. It lives about half an hour. But if the same operation be performed upon puppies of the same age, benumbed with cold, they will live a whole day. In the first case, the author thinks, and plausibly, the small quantity of air is insufficient to counteract the effect of the heat; whilst in the other, it is sufficient to prolong life considerably; and he deduces the following practical inferences applicable to the adult age, and particularly to man.

"A person is asphyxiated by an excessive quantity of carbonic acid in the air which he breathes; the beating of the pulse is no longer sensible, the respiratory movements are not seen, his temperature however is still elevated. How should we act, to recal life? Although the action of the respiratory organs is no longer visible, all communication with the air is not cut off. The air is in contact with the skin, upon which it exerts a vivifying influence; it is also in

contact with the lungs, in which it is renewed by the agitation which is contantly taking place in the atmosphere, and by the heat of the body which rarifies it. The heart continues to beat, and maintains a certain degree of circulation, although not perceptible by the pulse. The temperature of the body is too high to allow the feeble respiration to produce upon the system all the effect of which it is susceptible. The temperature must then be reduced, the patient must be withdrawn from the deleterious atmosphere, stripped of his clothes, that the air may have a more extended action upon his skin, exposed to the cold, although it be winter, and cold water thrown upon his face until the respiratory movements reappear. This is precisely the treatment adopted in practice to revive an individual in a state of asphyxia. If instead of cold, continued warmth were to be applied, it would be one of the most effectual means of extinguishing life. This consequence like the former, is confirmed by experience.

"In sudden faintings, when the pulse is weak or imperceptible, the action of the respiratory organs diminished, and sensation and voluntary motion suspended, persons the most ignorant of medicine are aware that means of refrigeration must be employed, such as exposure to air, ventilation, sprinkling with cold water. The efficacy of this plan of treatment is explained on the principle before laid down.

"Likewise in violent attacks of asthma, when the extent of respiration is so reduced that the patient experiences suffocation, he courts the cold even in the most severe weather, he opens the windows, breathes a frosty air, and finds himself relieved." p. 149.

As a general rule, an elevated temperature accelerates the respiratory movements, but the degree of temperature requisite to produce this effect, is not the same in all. The object of this is, that more air shall come in contact with the lungs in a given time, so as to reänimate what the heat depresses.

In young animals, especially such as are born without the power of maintaining their temperature in the open air, as soon as they are exposed to cold the respiration increases in rapidity and extent, and their temperature begins to fall. They present, according to our author, the phenomena of an attack of *febris algida*, and this state is quickly fatal, if not remedied by renewing the heat of the body.

"Although the acceleration of respiration is a powerful means of counteracting the effects of cold, by extending the contact of the air with the organs best adapted to feel its vivifying influence, this acceleration has its limits: it may diminish, but cannot compensate for the effects of excessive cold.

In the progress of life, however, these young beings are less and less affected in their respiratory movements by the same temperature, until it ultimately has no influence over them, so that in adult age, the rapidity of their respiratory movements is much less subject to be influenced by external temperature: yet in them, if the cold be carried sufficiently far, an acceleration takes place in the respiratory

movements, until, the powers being exhausted, these movements, like all the others, languish, and fail.

From these and other facts, it would seem to follow, that when an individual experiences a change of constitution, which diminishes his production of heat, or consumption of air, he cannot endure that degree of cold, which previously would have been salutary to him, without experiencing, sooner or later, an alteration in the rate of his respiratory movements.

"Hence the necessity, when these two functions have experienced this alteration, as in cases of organic affection of the heart and lungs, of placing the patient in communication with a milder temperature, either artificially, or by change of climate." p. 156.

If an individual be kept quiet, and abstain from food, and sleep, his *perspiration* may be regarded as uniformly diminishing in each succeeding period of six hours:* in some a longer period may be necessary, in others a shorter. In some, M. Edwards thinks, successive diminution of perspiration may be observed in periods of three hours, but this he considers to be the minimum. The period of the greatest perspiration, when no obstructing cause exists, is generally, according to him, from the hour of rising in the morning—say six o'clock—till noon, and the losses are successively less in similar intervals, for the remainder of the twenty-four hours.

The hygrometric condition of the atmosphere, the state of motion and rest of the air, and the pressure of the atmosphere, have the same influence over this function in man as in animals.

Dr. Edwards, however, considers that these conditions affect only the insensible perspiration, or that which is produced by *evaporation;* but they do not produce sweat, which he regards as a process of *transudation;* thus making, with Haller, the insensible and sensible perspirations two distinct functions, although it appears to us there is not sufficient ground for the distinction. The insensible perspiration he looks upon as a purely physical phenomenon, whilst the sensible "is a loss ordinarily produced by a vital action, in the form of a liquid which transudes;" but even were we to admit the difference, the altered characters of the air might exert a decided effect on the cutaneous capillaries that are charged with the secretion. If the air, for example, be loaded with moisture, the perspiration cannot pass off, but accumulates on the surface, and under such circumstances it

* These periods are chosen to obviate the influence of the constant fluctuations that are observed in the amount of the perspiration at short intervals.

is probable, that the activity of the vital operation would be less than where it can readily be exhaled as it is formed. The vessels of the skin we regard as depuratory organs, like the kidneys, and we think this applies to them as organs of the insensible as well as of the sensible transpiration. It cannot be denied, however, that a certain extent of evaporation of fluids may take place in the living as well as in the dead body, and the loss, produced in this way, must be added to that experienced through the function of perspiration.

On the effect of suppression of perspiration M. Edwards expresses himself in a rational and sound manner. It has always appeared to us, that this has been too blindly invoked as a cause of disease; and that the morbid influence, in such cases, is rather to be ascribed to the induction of irregular action of capillaries, extending its morbific effects to other portions of the frame, than to any check given to the cutaneous transpiration.

"All that we have hitherto shown on the subject of perspiration will considerably facilitate our examination of a question which naturally presents itself. Is perspiration susceptible of being suppressed? It is easier to resolve this question with regard to man and other warm-blooded animals, than with respect to the cold-blooded vertebrata. Let us see what is the result of a very low temperature upon warm-blooded animals. We know, by the effect of cold upon the sweat, that it diminishes transudation. Now let us suppose that it may, by its intensity, suppress it altogether, there will remain perspiration by evaporation which will always take place however humid the air may be. The high temperature of man and other warm-blooded animals, warms the air in contact with the body, and changes its hygrometric state by removing it from its extreme of humidity, and consequently occasions evaporation. If, on the other hand, the temperature of the air be raised to an equality with that of the body, at the time that it is saturated with humidity in order to suppress evaporation, then perspiration by transudation is excited, and takes place to such an extent in man and other warm-blooded animals, that the sweat will stream from all parts of the body. We can then in no case suppress their perspiration; it will be performed either by evaporation or by transudation. We ought therefore to be careful how we take literally what we find in medical books respecting suppressed perspiration. There can be no such thing. That there may be suppression of sweat, is evident to every one; but it does not follow that even in these cases there is no transudation.

"Since it is difficult to assure ourselves directly whether transudation is ever entirely suppressed in man and other warm-blooded animals, let us see what the cold-blooded vertebrata will offer on this point.

"The batrachians are the best adapted to this kind of researches, on account of the nakedness of their skin, of the fineness of its texture, of the copious loss which may be incurred through its medium, and consequently of the relation which their perspiration bears to that of man.

"On exposing frogs to the temperature of 0° cent. 32° Fahr. in humid air, in

order to suppress perspiration by evaporation, they have lost by transudation, in different experiments, the 30th part of their weight. Transudation is more abundant in these animals than in man, though the latter be placed in circumstances much more favourable. When we consider how sensible these creatures are to cold, how much the activity of all their functions is diminished at a low temperature, and how much they may even then lose by transudation, it is not to be supposed that cold suppresses this mode of perspiration in man, and the less so from his having a temperature of his own which varies very little with the changes of the atmosphere, a condition which has a powerful tendency to maintain transudation. It may be very much diminished by the action of cold but it appears that it cannot be altogether suppressed.

"It is a remarkable, but well-known fact, that when life is sinking, and to appearance nearly extinct, the body is covered with sweat—so strong is the tendency to continue this function."

Lastly, as the author has properly remarked, if the body were immersed in a denser medium than air—in water, for instance, supposing that it had no physiological action on the skin, it would merely prevent the contact of the air, and consequently suppress evaporation; but the vital action of the perspiratory vessels would continue, although we cannot think to the same extent, as in the air; but the deficient depuration would probably be made up by exhalation from the lungs and kidneys.

On the question, whether absorption of water takes place through the skin in man, M. Edwards is in the affirmative. He has no doubt, too, that it is readily effected when the body is placed in humid air. The experiments on this subject by Sanctorius, Seguin, Rousseau, &c. are sufficiently discrepant, but still we think enough has been done to demonstrate, that cuticular absorption is not easy; and that one of the great uses of the cuticle is to obviate the evils that might result, provided it were more readily effected. Yet the lizard, whose skin is scaly, after having lost weight by exposure to the open air, recovers its weight and plumpness when placed in contact with water, and if the scaly skin of the lizard permits such absorption, Dr. Edwards thinks it is impossible not to attribute this property to man.

The experiments of Seguin and Rousseau exhibit, as we have remarked, that this is by no means easy, but we can readily conceive, from the facility with which water soaks through animal tissues, that if the animal body be immersed sufficiently long in it, and especially if the vessels have been previously drained, imbibition might take place to a considerable extent, until a state of healthy fulness were induced. But this would be a mere mechanical, or physical absorption, and could be effected in the dead body as well as in the living.

In the chapter on *Temperature*, in which is investigated the degree of heat that man and animals can endure, the author does not offer any new results. He notices the well-known effects, such as the acceleration of the pulse, and of respiration, the feeling of greater or less heat, &c.

The power of maintaining the heat with but slight modifications, has been long admitted. The experiments of Sir CHARLES BLAGDEN, Dr. FORDYCE, Dr. FRANKLIN, and others, had sufficiently established it. The greatest elevation was experienced by MM. DELAROCHE and BERGER in their own persons. The temperature of the former was raised from 97°.8 to 106° by staying eight minutes in a stove, heated to 176° Fahrenheit. Experiments cannot, of course, be instituted on man to ascertain the highest degree his temperature can attain under the influence of excessive atmospheric heat; but M. Edwards considers, from the general results of experiments on warm-blooded animals, that he could not, under the influence of excessive heat, in a dry air, experience during life a higher rise of temperature than 12°.5 or 14° Fahrenheit.

The author assigns, with Delaroche and Berger, the agency of keeping down the temperature of animals, when exposed to heated air, to the evaporation which takes place from them. This, he thinks at least, would be sufficient, when the air has a temperature above that of warm-blooded animals, "but below this limit it would be incorrect to attribute to this cause, as is generally done, the real or supposed power of man, and other warm-blooded animals, to maintain uniformity of temperature under the vicissitudes of seasons, and climates." p. 201.

On investigating the refrigeration or cooling in different media, at temperatures inferior to that of the body, M. Edwards found, as a general result, that the refrigeration was the same in humid as in dry air, whence it would follow, that the cold, produced by the greater evaporation in the dry air, was balanced by the cold resulting from the contact of the humid air. In air at rest, at a temperature inferior to that of the body, heat is lost in three ways; by evaporation, by contact, and by radiation. If the air be agitated, its radiation will not be affected; but the constant change of the air considerably increases the quantity of heat abstracted by contact, and this in a degree proportioned to the rapidity of the current. Evaporation is also augmented according to the velocity of the wind, and it is owing to these circumstances, that we have often a powerful sensation of cold, when the temperature may be the same, and the only change in the atmosphere may have been the greater velocity of its motion.

The fifteenth chapter contains novel and ingenious remarks *on the influence of light upon the development of the body.* Its influence on inorganic bodies and on vegetables being undoubted, M. Edwards conceived, that it might not be less manifested on animals. Its effect in producing those maniacal exacerbations, which occur at the full moon, and which have been generally ascribed to the direct agency of that luminary, is unequivocal. The *etiolation*, too, or blanching, perceptible in the countenances of the miner, and the civic resident, has been ascribed to its deficiency, but it is obviously difficult in these cases to distinguish the effect of the privation of light from other deleterious agencies that abound in such localities. Our author's attention was therefore directed to the effect of light on the development of animals; in other words, on those changes of form, which they undergo in the interval between conception and the adult age. He found, that absence of light manifestly retarded the transformation of the tadpole into the frog, and conversely that its presence favoured the development of form. His researches on this point led him to the following interesting and instructive inferences:—

"In the climates in which nudity is not incompatible with health, the exposure of the whole surface of the body to light will be very favourable to the regular conformation of the body. This application is confirmed by an observation of Alexander de Humboldt in his voyage to the equinoctial regions. Speaking of the Chaymas, he says: 'Both men and women are very muscular, their forms are fleshy and rounded. It is needless to add that I have not seen a single individual with a natural deformity. I can say the same of many thousands of Caribs, Muyscas, and Mexican and Peruvian Indians, which we have observed during five years. Deformities and deviations are exceedingly rare in certain races of men, especially those which have the skin strongly coloured.'

"On the other hand we must also conclude that the want of sufficient light must constitute one of the external causes which produce these deviations of form in children affected with scrofula, which conclusion is supported by the observation that this disease is most prevalent in poor children living in confined and dark streets. We may from the same principle infer that in cases where these deformities do not appear incurable, exposure to the sun, in the open air, is one of the means tending to restore a good conformation. It is true that the light which falls upon our clothes, acts only by the heat which it occasions, but the exposed parts receive the peculiar influence of the light. Among these parts, we must certainly regard the eyes as not merely designed to enable us to perceive colour, form and size. Their exquisite sensibility to light must render them peculiarly adapted to transmit the influence of this agent throughout the system, and we know that the impression, of even a moderate light, upon these organs produces, in several acute diseases, a general exacerbation of symptoms." p. 111.

The last chapter but one in the book is on the *Alterations in the*

Air from Respiration. On many topics, connected with this subject, much discordance has prevailed amongst observers. All, however, have remarked, that oxygen disappears, and carbonic acid is formed, but no agreement exists as to the mode in which these results are produced.

Two chief chemical hypotheses have been formed for this purpose. The one—that of Black, Priestley, Lavoisier, and Crawford—that the oxygen of the inspired air attracts carbon from the venous blood, and that the carbonic acid is generated by their union. The other, which has been supported by Lagrange, Hassenfratz, and others, that the carbonic acid is generated in the course of the circulation, and is given off from the venous blood in the lungs, whilst oxygen gas is absorbed.

The first section of the chapter in the work of M. Edwards is dedicated to an inquiry into the proportion of the oxygen that disappears to the carbonic acid produced. In Priestley's experiments, the latter seemed to have the preponderance. Menzies, Crawford, Allen and Pepys, Dalton, Prout, Henry, and others, thought they were equal; Lavoisier and Seguin estimated the oxygen, consumed in the twenty-four hours, to be 15661.66 grains; whilst the oxygen, required for the formation of the carbonic acid exhaled, was no more than 12924 grains; and Sir Humphry Davy found the oxygen consumed in the same time to be 15337 grains; whilst the carbonic acid produced was 17811.36 grains; which would contain 12824.18 grains of oxygen.

The experiments of Edwards show, that the discordance has not depended so much upon the different methods and skill of the experimenters, as upon other causes. He found, on comparing the results of individual experiments, a great difference in the proportion of the oxygen absorbed to the carbonic acid produced, ranging between rather less than a half, and one-sixth, but the quantity of carbonic acid produced was very uniform, when the circumstances were similar. He found also, that the variation depends upon the particular animal species subjected to experiment; upon its age, or on some peculiarity of constitution, and that it differs greatly in the same individual at different times.

The disagreement of experimenters, regarding the exhalation or non-exhalation of azote from the air, during respiration, is even greater than in the case of oxygen. Priestley, Davy, Humboldt, Cuvier, Thomson, and others, found a less quantity exhaled than was inspired. Spallanzani, Lavoisier and Seguin, Vauquelin, Allen and Pepys, Ellis, and Dalton, inferred, that neither absorption nor

exhalation takes place,—the quantity of that gas undergoing no change during respiration; whilst JURINE, NYSTEN, BERTHOLLET, and DULONG and DESPRETZ found an increase in the bulk of the azote. The inferences of our author are, that in a large number of cases the azote inspired and expired so nearly approaches to equality, that the slight difference may be disregarded, and exhalation rejected; and, that in a great number of other cases, the excess of azote is so considerable, that the exhalation of this gas cannot be denied, inasmuch as the quantity greatly exceeds the volume of the lungs, and bears a large proportion to that of the animal. The causes of these variations appear to be numerous, and ascertainable with difficulty.

The experiments of M. Edwards with regard to the exhalation of carbonic acid, ready formed, from the lungs, are very decisive. Spallanzani had affirmed, that when certain of the lower animals, as snails, are confined in gases that contain no oxygen, the production of carbonic acid is uninterrupted. On the strength of this assertion, our author confined frogs in pure hydrogen for a length of time. The result indicated that carbonic acid was produced, and in such quantity as to show, that it could not have been derived from the residual air in the lungs, as it was in some cases equal to the volume of the animal. Indeed, it occasionally amounted to five or six per cent.—considerably exceeding the bulk of the animal. The absorption of a considerable portion of hydrogen was also noticed.

The experiments were repeated on fishes, snails, and on kittens two or three days old, with similar results.

With respect to the source of the carbonic acid, M. Edwards concludes, that both in hydrogen and in atmospheric air, the carbonic acid is owing to exhalation, and that it proceeds wholly or in part from the blood, which has been proved to contain carbonic acid by VAUQUELIN, VOGEL, BRANDE, Sir EVERARD HOME, and others. When blood is placed in hydrogen, it exhales carbonic acid.

The following general views of the alterations effected in the air by respiration is given by the author:—

"The oxygen which disappears in the respiration of atmospheric air is wholly absorbed. It is afterwards conveyed, wholly or in part, into the current of circulation.

"It is replaced by exhaled carbonic acid, which proceeds wholly, or in part, from that which is contained in the mass of the blood.

"An animal breathing atmospheric air also absorbs azote; this is likewise conveyed wholly, or in part, into the mass of the blood.

"The absorbed azote is replaced by exhaled azote, which proceeds wholly, or in part from the blood.

"Here are four fundamental points:

"1st. The absorption of oxygen which disappears.
"2d. The exhalation of carbonic acid which is expired.
"3d. The absorption of azote.
"4th. The exhalation of azote.
"The two first relate to the oxygen, the two others to the azote.

"According to this view, respiration is not a purely chemical process, a simple combustion in the lungs, in which the oxygen of the inspired air unites with the carbon of the blood, to form carbonic acid, to be expelled; but a function composed of several acts. On the one hand there are absorption and exhalation, attributes of all living beings; on the other the intervention of the two constituents of atmospheric air, oxygen and azote.

"This view is not a preconceived idea, but a result to which we have been necessarily led by a multitude of facts.

"It exhibits to us animated beings drawing from the composition of the atmosphere two of their constituent principles.

"It furnishes us with numerous inferences, several of which are supported by facts already received in science.

"Thus the oxygen which disappears being absorbed, and the carbonic acid exhaled, the relative proportions are necessarily variable, from the nature of the two functions which must vary in the extent of their action. The fact is beyond doubt. They may vary in three ways. 1. The carbonic acid may be expired in smaller quantity than the oxygen which disappears; 2, in equal quantity; 3, in excess. The first is the ordinary case; the second is supported by the experiments of Allen and Pepys; the third, if it is not yet established, will probably be so hereafter. I might even say that it is so already, when we revert to the experiment of Allen and Pepys, relative to respiration in factitious air, composed of oxygen and hydrogen. The same observation applies to azote absorbed and exhaled.

"Let us return to the oxygen, and consider what becomes of it in the system. When it is absorbed and carried into the blood, there is every reason to believe, that it contributes to the formation of carbonic acid. But the experiments which I have already detailed prove, that it cannot be the only source of the gas contained in the blood.

"Since we have shown, that certain species of animals can exhale in a given time, as much carbonic acid in hydrogen, as in atmospheric air, there must be one or more subsidiary sources for the carbonic acid contained in the blood. It is easy to point out one. We know, from the researches of Jurine, Chevreul, Magendie, and others, that this gas exists in almost the whole extent of the alimentary canal. We cannot but admit, that it is formed in the process of digestion. It is in contact with almost the whole mucous surface of the alimentary canal, and a part must be absorbed. If any doubt of this were entertained, cases might be cited in which water impregnated with carbonic acid, and drunk in sufficient quantity, has produced symptoms of asphyxia. Doctor Desportes has communicated observations on this subject to the Royal Academy of Medicine.

"With respect to the oxygen which is to contribute to the formation of the carbonic acid contained in the mass of the blood, one of two things must happen. It enters into combination either suddenly or slowly. In the latter case there will be oxygen in excess, circulating in the mass of the blood. This pure

oxygen will therefore be subject to exhalation, which will take place in the organs adapted for giving passage to it, as happens in fishes, in the air bladders of which animals oxygen is found. I propose following up this subject, and examining different kinds of blood, in conjunction with M. Dumas." p. 244.

Not the least important portion of Dr. Edwards's work is the concluding chapter, relative to the *applications* of the deductions arrived at from the experiments detailed in the previous chapters; and the first he makes regards the faculty of producing heat. This faculty was shown to vary during health, and it varies still more in a state of disease.

The phenomena presented by torpid animals, and by the mammalia, and birds that are not torpid, leads Dr. Edwards to infer, that during the state of *natural sleep* there is a diminution in the power of producing heat; so that the application of cold, a damp and cold air, or a dry and piercing wind, which could be borne with impunity in the waking state, may act most injuriously during sleep.

The natural sleep of hybernating animals, he thinks, merits the denomination of *lethargic sleep*, from the remarkable diminution of temperature, respiration, and circulation, as well as of the external motions, and excitability of the senses, but similar changes he conceives may take place in man, so as to render his sleep lethargic, and he is disposed to believe in the instances of this kind of lethargic sleep, detailed in medical works,—affirms, indeed, that his own experience has convinced him that such cases do occur. We wish M. Edwards had detailed the cases. The instances of trance, lethargy, &c. of which there are so many on record, have certainly appeared to us sufficiently marvellous, and it would take all the weight of M. Edwards's facts and authority to alter our opinions upon the subject. At one time, it was universally believed, that substances could be administered, which might arrest the whole of the vital functions, or cause them to go on so obscurely as to escape detection, a notion which is embraced by Shakespeare, in his *Romeo and Juliet*:—

"Take then this phial,
And this distilled liquor drink thou off;
When presently through all thy veins shall run
A cold and drowsy humour, which shall seize
Each vital spirit, for no pulse shall keep
His natural progress, but surcease to beat.
No warmth, no breath shall testify thou livest,
The roses in thy lips, and cheeks shall fade
To paly ashes; the eyes windows fall
Like death, when he shuts up the day of life;
And in this borrow'd likeness of shrunk death,
Thou shalt continue two-and-forty hours,
And then awake as from a pleasant sleep."

No one, however, at the present day, believes in the existence of any such medicament.

2. In his second "application," he assimilates the effect produced upon young animals by refrigeration, to the defective power of producing heat in the *febres intermittentes algidæ*, described by Torti, in which the power is so far impaired, that the patient dies in the cold stage, at the end of two or three paroxysms, if suitable remedies be not employed.

"3. Since the application of external heat tends to reänimate the power of producing it, this means may be substituted for the extraordinary efforts of the system, which tend to the same object. It may be done either to prevent them, or to shorten their duration."

4. From the experiments, connected with dry and moist air, he considers, that damp cold must tend to produce, in individuals whose power of developing heat is rather feeble, the series of actions which constitute the accession of an intermittent fever, especially if they are exposed to that influence during sleep. Such a state of the atmosphere is, indeed, a great exciting cause of intermittents, provided a predisposition exists, derived from a malarious locality, but without this predisposition, the exciting cause might be applied in vain. In many parts of every country intermittents are unknown, notwithstanding the prevalence of winds of the character described.

5. Dr. Edwards transfers his results, connected with the influence of the seasons on the production of heat, to the question of the influence of climates, and as the animals, in his experiments, appeared to exhibit a summer and a winter constitution, he compares the former with that of the inhabitants of warm climates, and the latter with that of the inhabitants of cold climates; "but there will be this difference, that the modification which characterizes the summer constitution in our climate, will be much more strongly marked in warm climates."

Now, in individuals whose constitution is suited to the climate, there is a diminution of the power of producing heat in summer, and an increase in this respect in winter, whence he concludes, that this power will be feebler in the inhabitants of warm, than in those of cold climates, and consequently, when they change their climate, they must be, in general, less capable of supporting the cold, than the natives of the country.

6. In warm climates, a remedy is found for the excessive heat, in the increased evaporation which takes place, but its influence is considered to be exaggerated, when it is supposed that an exact compensation can be effected by it.

7. Does the temperature of man and of warm-blooded animals

vary according to the season? The general belief has been, that it is constant in the state of health and in ordinary circumstances, notwithstanding the heats of summer and the colds of winter. From several experiments, however, tried by our author on yellow-hammers and sparrows, at different periods in the course of the year, it would result, that the averages of their temperature ranged progressively from the depth of winter to the height of summer, within the limits of 5° or 6° Fahrenheit: and the contrary course was observed in the decline of the year. Hence he infers, and with every reason in his favour, that the temperature of man experiences a similar fluctuation.

8. The human temperature is rarely raised beyond 106° Fahrenheit, in the hottest of all diseases, scarlatina. Dr. James Gregory, of Edinburgh, used to assert, that he doubted the accuracy of the thermometer when a higher temperature was indicated. M. Edwards alludes to a case of tetanus, communicated to him by M. Prevost, of Geneva, in which the temperature rose to 110°.75 Fahrenheit; so that if the healthy temperature of the child was 98°.2, here was a rise of 12½°, Fahrenheit.

9. To reduce this excessive heat, external agents of a suitable temperature are most effectual: damp cold, of all external means of refrigeration, tends best to diminish the activity with which heat is developed. Hence its value as a refrigerant in fevers, now universally acknowledged.

10. But if damp cold cannot be sufficiently prolonged, sponging with water of any temperature, provided it be not excessively hot, occasions a more abundant evaporation, and a salutary refrigeration, the effect of which is extended to other parts of the frame, by virtue of the extensive sympathy that exists between all parts of the capillary surface.

11. When the ventilation of an apartment is properly attended to, the quantity of heat is diminished, both by the contact of fresh portions of air, and by increased evaporation.

12. Excessive evaporation is injurious to man. The distress, experienced in the higher regions of the atmosphere—on the tops of mountains, or in balloons—is rather owing to this cause, perhaps, than to the rarefaction of the air, although the latter has its effects. In the celebrated aerial voyage of Gay Lussac, he found that the air contained, at the height of 23,000 feet, only one-eighth of the moisture necessary for its saturation. Owing to this cause, such an increase of evaporation takes place from the dermoid surface, under these circumstances, that the loss of fluid occasions a sensation of distress in the chest, proportionate to the desiccation.

"If, as frequently happens upon mountains, the weather change quickly, loading the air with humidity, the evaporation becomes moderate and the distress diminishes, or ceases entirely. If it still continue it is owing to the rarefaction of the air. The effect of evaporation is felt the first, and that which is owing to a want of air comes long after: it requires even a much greater height to produce it than one would be inclined to believe when the two sensations are confounded.

"Thirst is a symptom which attends the ascent of mountains. It is sometimes intense, when it cannot be ascribed to the fatigue of exercise. It is only momentarily satisfied, even by abundant and often repeated draughts. But if the air becomes charged with moisture, the thirst at the same time disappears. Here is an example perfectly analagous to that which we have elsewhere mentioned as the effect of a partial desiccation, although the body may be furnished with a sufficient quantity of water to prevent its losing its total weight, the distribution of the liquid to the different part not being in sufficient proportion to repair local loss. It is obvious that this influence will be very differently felt by different individuals, according to the state of the lungs." p. 260.

13. Dr. Edwards alludes to a symptom, connected with respiration limited by rarefaction of the air, which has not been usually noticed—a disposition to vomit. This has been observed during the ascent of great heights, and the author thinks the symptom, thus induced, may be connected with a great many others, in which respiration is limited in various ways, as in acute or chronic congestion of the lungs, "when the disposition to vomiting, and vomiting itself, are frequently symptoms arising from the diminution of the communication of the system with the air."

14. Species and individuals vary greatly in their power of supporting limited respiration. It would not seem, that the limits, at which extreme rarefaction produces effects almost as rapid as those of the absolute privation of this fluid, differ greatly in warm-blooded animals. The pressure at which yellow-hammers were on the point of dying, corresponded, taking the average, to 5.31 inches of the barometer; the average for Guinea pigs, to 3.58 inches; and these animals presented the extreme results.

15. Facts, connected with excessive evaporation from the lungs, are observed in other than elevated regions. When, during a very sharp cold in winter, a room is warmed by means of a stove, a painful sensation in the chest is experienced by many. The air, in a frost, contains scarcely any watery vapour, and the heat of the stove, by raising the temperature of the air, increases its capacity for vapour, so that, at an equal temperature, the quantity of liquid dissipated by evaporation is much greater than in summer. To remedy this, in some

measure, we are in the habit of placing a vessel of water upon the stove, and it is advantageous.

"In arid districts," says M. Edwards, "effects are ascribed to the heat of the air and of the wind, which arise, in a great degree, from the evaporation occasioned by the dryness of the atmosphere. Dr. Knox, who travelled in the interior of Africa, to the north of the Cape of Good Hope, has related to me facts, which justify this opinion." p. 263.

16. In an agitated atmosphere, not extremely humid, evaporation, as a general rule, may be as great as in a calm and dry air; but if we suppose two states of the atmosphere in which the effects of motion in the one would equal those of dryness in the other, their respective influence upon evaporation would not be the same.

"Air in motion only acts upon exposed surfaces, as the integuments of the body; those of the lungs are sheltered, and notwithstanding their communication with the atmosphere, the agitation of the air has but a slight share in the quantity of vapour which they furnish. This consideration will serve to determine the choice of suitable places for the residence of delicate persons. Those to whom the increase of evaporation from the lungs is injurious, ought to prefer an atmosphere less dry, but slightly agitated, when it is important to obtain an agreeable freshness." p. 264.

17. To remedy the dryness of the skin, and air passages, which acts most prejudicially, in the opinion of the author, in a great number of acute diseases, and for which drinking is insufficient, the atmosphere ought to be rendered moist by a sufficient evaporation of water, by which means the desiccation of the respiratory organs may be arrested.

18. The author properly inculcates the necessity of guarding children against the injurious impressions of cold in cold climates and seasons, by appropriate clothing, and he ascribes much mischief to a neglect of these precautions. Although the want of warm clothing is actually felt, its use is often declined from a wish to reserve it for an advanced age; but our author thinks it frequently happens, that this very precaution is the cause of preventing that age from being attained.

19. Clothing is insufficient to preserve the heat so as to maintain the existence of very young animals, and of infants born about the period when they begin to be *viable* or rearable. The continued external application of heat is demanded, until the body has acquired sufficient development; and the same remarks are applicable to every period of life, when the constitution, from any cause, approximates to the modification in question.

20. This "*application*" treats specially of the effects attributed to

suppression of perspiration, of which we have already expressed our opinion.

21. If we compare the daily average of meats and drinks, during the course of a year, with the sum of all the losses by perspiration, and the alvine and urinary evacuations, it will be found that they are nearly the same. On taking the average results of observers, it is found that the proportion of urine to perspiration is, on the whole, about 1 to 1.08. The alvine evacuation forms but a small portion of the total loss, the mean of all the tables being four ounces.

"By subtracting this quantity from the sum of the meats and drinks, and taking the half of the remainder, we shall have an approximate result of the mean product of the perspiration of a day in the course of the year. In order to judge of the degree of approximation which may be attained, by making use of these data with the mere knowledge of the sum of meats and drinks, we give the comparison of the results furnished by experience, with those deduced by calculation from the preceding proportions.

"*Mean Losses by Perspiration in a Day.*

	Robinson.	Robinson.	Keill.	Rye.	Lining.
	42 yrs.	64.5 yrs.	39 yrs.	42 yrs.	40 yrs.
By observation,	45 oz.	27 oz.	30 oz.	56 oz.	60 oz.
By calculation,	41	27	35	46	62

It is found, that in temperate climes the mean perspiration in summer exceeds the urine; whilst in winter the contrary holds good. In warm climates the average of perspiration for the year doubtless exceeds the average of the urine.

22. M. Edwards lays great stress upon the effect of slight agitation of the air, when the hygrometric state and temperature are adapted to the system: the chest, under such circumstances, dilates, and admits a large proportion of air; and he thinks that persons who have what is called delicate lungs, may owe in a great degree the difficulty and oppression which they feel to the smallness of their apartments; as the difficulty decreases on going into a large room, or into the open air; and he affirms, that whatever difference of purity may be attributed to the air of small and of large towns, of narrow and of wide streets, of town and of country, the degree of agitation of the air has the most marked influence on the extent to which the chest dilates; and the agreeable sensation, which is experienced on breathing in the country is principally due, he conceives, to that cause.

24. As young animals bear a limited respiration better than adults, he infers, that children, in whom respiration may be limited by engorgement of the lungs, will, *cæteris paribus*, be in less danger than adults, in whom respiration may be limited in like manner, and to

the same degree, and as the disturbance of the system, indicated by the acceleration of respiration, circulation, &c. is so much the greater as the want of air is the more pressing, the symptoms of pneumonia will be more intense in adults, in cases in which the relative extent of disease is equally limited.

25. If, therefore, an individual be affected with pneumonia, so far as to endanger his life by diminished communication with the air, the most urgent indication will be to employ the best means for bringing back his constitution to that state which would enable him to support his limited respiration. For this purpose, blood enough must be abstracted to diminish the power of producing heat, and keep it within the limits compatible with life. The more serious the case, the greater ought to be the abstraction of blood. Such is the author's theory. We would inculcate the same practice, under the obvious indication that the inflammation must be got under, otherwise it will run on to disorganization and death.

Some other *applications* are given by M. Edwards, but they are mostly speculative, and not as pregnant with interest or novelty as those we have considered.

The following remarks in his concluding application are, however, important.

"We find in the changes which the blood can undergo as to its composition, a fertile source of the changes in the mode of vitality. It would appear at first that it is only through this medium that we can act on the nervous system, in order to modify its action so as to change the constitution of individuals; on account of the extent in which this fluid can vary, and of the apparent immutability of the nervous system in its form and structure.

"It is evident, that the dimensions and proportions of that system have limits assigned by nature to the modifications which their vitality can undergo; it is, however, susceptible of considerable changes, not discernible by inspection, but which manifest themselves by the actions which result from them, and which do not arise from the influence of the blood. Such effects may, as we have formerly proved, be produced by temperature, by light, electricity, and a number of other influences by contact to say nothing of moral causes. It is this which I have had in view in speaking of the special action of the air on the system, and which I have designated vivifying influence.

"It is thus that the impression of the air serves to reänimate a life almost extinguished in the case of apparent death, and here man has an advantage over all warm-blooded animals, even the hybernating. Their skin, covered with hair or feathers, is less accessible to the air; and I have never seen an adult individual which, after the cessation of all external motion by submersion in water, has been recalled to life by exposure to the air. Man, on the contrary, whose skin is bare, delicate, and sensible, may be reänimated by the action of the air, when he appears to have lost, under water, sense and motion.

"We have shown elsewhere, that new-born children, when deprived of air, would not give signs of life during so long a space of time as young mammalia

of the same age, which are born with closed eyes; they will, however, more easily recover from apparent death, because their skin is adapted to receive a stronger impression from the air.

"We have seen how fatal heat is in cases of asphyxia, and of very confined respiration. Now, when the action of the air is reduced to the effects which it produces upon contact with the skin, its influence is the weakest possible, and at first it cannot easily be conceived what advantage can be derived from the application of heat. If that application be of long duration it will be fatal; in some cases it may be useful if it is of short duration. When an animal is plunged in water at the temperature of 40° cent. or 104° Fahr., its motions are much more forcible, but less numerous than at inferior temperatures. There are circumstances, then, in which heat may be momentarily applied in order to excite the movements of the chest. The immersion of a great part of the body in warm water, is frequently an efficacious means of reänimating a child just born without signs of life. As soon as motion is produced, or if it be slow in manifesting itself, it will be right to abandon a method, the prolonged use of which, would be fatal.

"We must, therefore, look upon the vivifying influence of the air in two points of view, its direct action on the nervous system by contact; and its action on the blood by the changes which it produces in it. In like manner, the vitality of individuals may be modified by a number of other causes which act immediately, either on the nervous system, or on the blood. Many facts mentioned in this work, are examples of both modes of action."

We have thus endeavoured to lay before the reader a full and clear analysis of the topics embraced in the original work of Dr. Edwards, as well as in the version before us. No one can witness the labour and research bestowed by the author without being impressed with his preëminent qualifications as an experimental physiologist, and without according with the encomiastic remarks of Dr. Hodgkin.

"Some minds," he observes, "are so happily constituted as to have a remarkable readiness in perceiving the relations which connect facts and observations, which to others appear not merely isolated, but absolutely contradictory. This appears to be particularly the case with Dr. Edwards. The labours of his predecessors had accumulated a vast collection of invaluable facts and observations, many of which seemed to be almost annihilated by their standing in direct opposition to others supported by equally valid and respectable authority: the labours of Dr. Edwards have explained many of these discrepancies. It may be ill-becoming in me to anticipate the judgment of the reader, but I cannot refrain from expressing my admiration of the patient and clear induction with which the doctor proceeds, step by step, through the great variety of subjects comprised in his work, so as to maintain the unity and connexion of the whole, and of the happy art with which he has both availed himself of the experiments and observations of his predecessors, and supplied the breaks and deficiencies which he met with, by well-contrived, simple, and conclusive experiments of his own." Preface, p. v.

The appendix to the work by the translators, consists of various papers by Dr. Hodgkin and other individuals. The first is on *Elec-*

tricity, by MM. Prevost and Dumas, and comprises a detailed account of their views regarding muscular contraction, which were briefly explained in a late number of this Journal.* The second is by Dr. Edwards, and is "*On Muscular Contractions produced by bringing a Solid Body into contact with a Nerve without a Galvanic Circuit.*" It has been long known, that when nerves and muscles are exposed in a living animal, and brought into contact, contractions or convulsions occur in the muscles. The experiments of GALVANI, VOLTA, ALDINI, PFAFF, HUMBOLDT, and others, had satisfactorily established this. In the experiments of M. Edwards, the same effect was produced by touching a denuded nerve with a slender rod of silver, copper, zinc, lead, iron, gold, tin, or platina, and drawing it along the nerve for a space of from a quarter to a third of an inch. He took care to employ the metals of the greatest purity, and as they were supplied to him by the assayers of the mint. But it was not even necessary that the rod should be metallic, he succeeded with glass or horn. "To produce muscular contraction it is sufficient that the nerve be touched with any solid body in the manner above related." All these metals, however, did not produce equally vigorous contractions. Iron and zinc were far less effective than the others, but no accurate scale could be made of their respective powers.

Much difference is found to exist when electricity is employed, according as the nerve is insulated or not, for as the muscular fibre is a good conductor of electricity, if the nerve be not insulated, the electricity is communicated to both nerve and muscle, and its effect is consequently diminished. It became interesting to know, whether any difference would be produced, when one metal only is used, if the nerve be insulated or not. In the experiments, above referred to, the nerve was insulated by passing a strip of oiled silk beneath it. A comparison was now made between an animal so prepared, and another in which the nerves, instead of being insulated, reposed on the subjacent flesh.

"I made use," says M. Edwards, "of small rods, with which I easily excited contractions, when I drew them from above to below, along the portion of denuded nerve, which was supported by the oiled silk; but I was unable to excite them, when I passed them along the nerve of the other animal, in which they were not insulated. Frequent repetitions assured me, that the want of effect did not depend on difference in the degree of contact: I tried the experiment on many animals of the same species, lest there might be any thing in individual peculiarity. As in the one case the nerves were brought further into view, and kept somewhat tense and even with the sacrum, by means of the slip of oiled silk,

* Number XXIII. for May, 1833, p. 144.

whilst in the other they had no such support, I restored the parity of position, by placing under the unsupported nerves, a portion of muscle, corresponding to the slip of oiled silk, as well in size as mode of insertion, and still was unable to produce contractions by treating the uninsulated nerve, whatever was the material of the rod employed as the exciter. The difference was rendered still more striking, when instead of making the comparison between two individuals, it was made upon the same animal. After having in vain attempted to produce contractions by contact of a nerve resting upon muscle, I found that they might still be induced, if the oiled silk were had recourse to, and I was able to command their alternate appearance and disappearance, by using sometimes a non-conductor, and at others, a conductor for the support of the nerve." p. 313.

Somewhat surprised at these results, our author was stimulated to the investigation—whether some degree of contraction might not be excited by touching the uninsulated nerve? and, having observed, that in the insulated nerve contractions were most constantly produced by a quick and light touch, he adopted this method in an animal whose nerve was not insulated, and frequently obtained slight contractions.

All his experiments on this matter seemed to prove satisfactorily, that, *cæteris paribus*, the muscular contractions produced by the contact of a solid body with a nerve, are much less considerable, or even wholly wanting, when the nerve in place of being insulated, is in communication with a good conductor; "and it would seem to follow, as a legitimate conclusion, that these contractions are dependent on electricity;" facts, which it is highly necessary to bear in mind, in all experiments on animals, where feeble electrical influences are employed.

On the remaining selected articles we cannot dwell. The length to which this review has already extended, precludes us. We may merely remark, that in the article on *atmospheric electricity*, by Pouillet, the author ascribes its origin greatly to the changes effected during vegetation, and to the evaporation from the surface of the sea, which forms, in his opinion, one of the most important sources. Signs of electricity are produced by evaporation from an alkaline solution, but not from mere evaporation, whether rapid or slow. Lakes and rivers are, however, presumed to have their influence, since their waters are never perfectly pure, but contain alkaline impregnations.

The remaining papers consist of an extract from an *Essay on some of the Phenomena of Atmospheric Electricity*, by Luke Howard, F. R. S., which was published thirty-four years ago, with remarks on the same subject by the editor, (Dr. Hodgkin,) and experiments and observations by C. Woodward and P. Smith: Dr. Hodgkin's Inaugural Essay—*De Absorbendi Functione*—a fair specimen of such

essays, but not worthy perhaps of republication, in the same form, at least; with further remarks on the same subject, by the author: *On the Phenomena to which the names Endosmosis and Exosmosis have been given by* Dutrochet: *On the Microscopic Characters of some of the Animal Fluids and Tissues*, by J. J. Lister and Dr. Hodgkin; and lastly a "juvenile essay," by Dr. Hodgkin, *on the Uses of the Spleen*, published in the *Edinburgh Medical and Surgical Journal*, January, 1822; in which he regards, with others, the spleen as a diverticulum, and as fulfilling an office in the animal system, similar to that of tubes and valves of safety, in various kinds of chemical and mechanical apparatuses.

Many of these subjects have been noticed in the pages of this journal, and although the author's sentiments are manifestly regarded by him to be full of important bearings, we have strong doubts whether the physiological world will think them equally so. His microscopical researches have certainly destroyed the idea of the beautiful harmony and simplicity, that appeared to prevail in organized existence, from the microscopic researches of Dr. Milne Edwards, who found, that "spherical corpuscles, of the diameter of $\frac{1}{300}$th of a millimeter, constitute by their aggregation, all the organic textures, whatever may be the properties, in other respects, of those parts, and the functions for which they are destined."

Under this view of Dr. Edwards, it followed, of necessity, that all organized bodies possess the same elementary structure, and that the animal and the vegetable are readily convertible into each other, under favourable circumstances, and differ only in the greater or less complexity of their organization. The globular tissue is asserted by Dr. Hodgkin to be a mere illusion, and we have again to refer the most minute parts of the cellular membrane, muscles and nerves, to the striated or fibrous arrangement.

In the notes, p. 483, we have the old claim of Dr. Stevens—that he suggested to Drs. Faust and Mitchell their important experiments on the penetrativeness of gases, vindicated by Dr. Hodgkin; but on this we have already expressed our sentiments.*

With respect to the execution of the translation it is but moderate. Due attention has not been paid to the correction of the proofs; the verbal mistakes are numerous, and throughout the first portion of the work, the thermometric calculations are given in degrees and minutes; 33° 8′ for example, being written for 33°.8. Especial care should have been paid to prevent such mistakes, in a work whose great value i its accurate experimental details and estimates. R. D.

* American Journal of the Medical Sciences, for May, 1833, p. 201.

BIBLIOGRAPHICAL NOTICES.

XV. *A New Exposition of the Functions of the Nerves.* By James William Earle. Part I. Longman, Rees, & Co. 1833.

The author of the volume before us, very truly remarks, that when we consider the many and almost insurmountable difficulties which present themselves to the physiologist in inquiring into the hidden functions of the nervous system—the various sources of error and perplexity ever occurring to the inquirer from injury to its functions by the very means employed to examine into them—how essential it is to the existence of animals, and how little light the mere knowledge of the anatomical structure and disposition of the brain and nerves, has thrown upon the mode in which they operate in producing the different phenomena upon which the continuance of life depends, we can neither be surprised at the opposite conclusions at which some observers have arrived, nor at the unsatisfactory state of our knowledge up to the present hour.

Mr. Earle thinks, that our acquaintance with diseases of the nervous system may be considered as nearly parallel with that of our predecessors, with regard to those of the sanguiferous system before the discovery of the circulation of the blood. They had some idea of the pulmonary circulation, as we have of the different functions of the anterior and posterior spinal nerves;—

"Yet we wonder that they could have considered that the small amount of knowledge which they possessed, could enable them to account for phenomena of daily occurrence, and our successors, in like manner and with equal justice, will no doubt be surprised at us."

The author appears to be very confident of the novelty and importance of the views to which he has been led by his experiments relative to the functions of the nervous system in health and disease; for he remarks, that if the discovery of Harvey, admitting of such clear and satisfactory demonstration, met with violent opponents and a tardy acquiescence, in adducing facts which are addressed to the eye of reason only, he cannot expect to escape that share of prejudice and opposition which has always attended the announcement of novelty; nor that the opinions derived from the facts which he has brought forward will be readily allowed to be just; for, as it has been well observed by an old writer, "before truth in its silent and disputed march has roused the attention of the indolent, converted the supercilious, subdued the interested and obstinate, and reached the ears of all, an age has passed away."

The attention of Mr. E. was more particularly directed to physiology by the great alarm occasioned by the frequent occurrence of hydrophobia in the spring and summer of 1830, and by a consideration of the fact, that many diseases remain intractable until their nature is understood. It appeared to him that this was probably the case with hydrophobia—and that we should remain ignorant of the place to apply our remedies in that disease, as well as of the nature of those remedies, until we had ascertained the cause of the violent spasmodic ac-

tion of the muscles of the throat and chest. But in order to arrive at the cause of the improper action of muscles in disease, it was first necessary to understand the cause of their healthy action. This led to the examination of a multitude of experiments bearing upon the subject, and naturally involved the consideration of the laws which regulate the whole of the vital functions.

"But beyond inquiring into the cause of the healthy action of muscles, it was necessary to ascertain the nature of the power which enables them to contract at all; for it is as necessary that muscles should have a power of contraction as that there should be a power to call them into action, so that it may be useful for purposes connected with the maintenance and preservation of life."

As may be known to our readers, Dr. Wilson Philip, stated as the results of his experiments, that the contractility or power of contraction of the voluntary muscles, is entirely independent of any influence derived from the nervous system, as is also that of all involuntary muscles, though these last are at all times readily influenced through that system. These facts, as he himself admits, seem to imply a contradiction; but he agreed with Le Gallois, that two facts well ascertained, however inconsistent they may seem, do not overturn each other; but only prove the imperfection of our knowledge. It occurred to Mr. Earle, that as it is not common to find any inconsistency in nature, and as a great deal of evidence is brought forward by Dr. Philip upon a point but little requiring it—the readiness with which the involuntary muscles are influenced through the nervous system, the most important question might have been overlooked. He therefore determined to ascertain whether there actually was any inconsistency, and whether the facts from which such opinions were deduced were unobjectionable. He remarks, that the experiments of Le Gallois were considered by a committee of the French Institute as having entirely overturned many of Haller's opinions, and also as affording a satisfactory explanation of several facts which no one had ever accomplished before him.

"It has remained for the ingenuity of Dr. Philip to point out certain inferences which are not borne out by the facts adduced by M. Le Gallois. It is, in like manner, the object of the present investigation to show that many of the facts brought forward by Dr. Philip do not warrant the inferences he has drawn from them. As Dr. Philip considers some of his experiments not only confirm some of the most important of Haller's opinions, but remove all objections which have ever been made to them, so in refuting the conclusions of Dr. Philip these objections must be allowed to return in all their force; consequently, the observation which he makes upon the experiments of Le Gallois," by ascertaining some facts of great importance, while others immediately connected with them escaped his observation, have left the subject in greater confusion than he found it "may be applied with equal justice to his own."

It is to be remarked, that according to Mr. Earle there does not appear to be any reason to doubt the accuracy of Dr. Philip's experiments—with the exception of one. It is simply to the inferences deduced from them that he objects.

Mr. E. affirms, that if the details of Dr. Philip's experiments are read with due attention, it will be readily perceived that they do not prove, 1st, that the power of contraction or excitability of the muscles of voluntary motion is dependent on the mechanism of the muscular fibre, and independent of the nervous system; 2d, that the action of the heart and arteries is independent of the nervous system; 3d, that the nervous power is independent of the brain; 4th,

that the nervous power is identical with galvanism; and 5th, that the vital principle is independent of the brain. These points it is the object of his work to disprove.

He remarks that Dr. Philip has also fallen into a great mistake in confounding the "nervous power" with volition; and adds, that this mistake leads to great confusion with regard to what he (Dr. P.) called the sensorial power, of which he considers volition as forming a part. Whether Dr. Philip wishes to signify by this term the united functions of the whole brain, including the intellectual and moral faculties; or whether he only signifies volition, sensation, and that influence which secreting surfaces lose when their communication with this organ is interrupted by the division of their nerves, as three joined in one; or whether he means that they are independent of each other, it is, he thinks, absolutely impossible to discover.

"But whatever meaning Dr. Philip attaches to the term sensorial power, it is certain that its two most obvious properties, namely, volition and sensation, bear an opposite relation to each other; the one being an active and the other a passive property." "Besides this opposite relation, these properties are entirely independent of each other; because volition may be exerted spontaneously at any time without any distinct external impression having been previously conveyed to the brain along the posterior nerves; nor is the perception of any such impression of necessity followed by an exercise of volition. On this account the use of the term sensorial power is highly objectionable, and" "ought to be discontinued."

Previously to entering upon the examination of the facts from which Dr. Philip has drawn his inference, Mr. E. points out to what he regards as two important errors arising from a most unaccountable misconception of well-known facts, which are of sufficient importance to affect the whole doctrine of irritability. These errors have reference to the circumstances which cause the life and death of an acephalous fœtus; and to the reason why the heart of an animal continues to beat a short time after the head is cut off.

The phenomenon presented by the birth of a brainless fœtus has generally been referred to, as containing the most positive and convincing evidence, that the doctrine which teaches that the brain is the cause of all life and motion is erroneous. Mr. E. thinks, however, that it only requires a little more attention than has yet been paid to the circumstances attending these monstrous productions, to show that instead of contradicting, they usually confirm this doctrine. According to him, in order to investigate this subject properly, the first question asked should be, what is the cause of the motion of the first punctum saliens in the embryo. The motion of the red globules of the blood is certainly an effect of some cause or other; for we cannot imagine them capable of moving by any inherent property. This cause he feels disposed to refer to the nervous influence of the mother; because there is neither nerves nor brain in the embryo, nor, indeed, any thing belonging to the latter which can be the cause of the motion. If that cause has the power of originating the motion of the first punctum saliens, so also it must have the power to continue the motion of the blood until the fœtus is fully developed, and ready to be born; or in other words, capable of taking upon itself the maintenance of an independent existence.

"For this purpose it is necessary that the young animal should be provided

with an apparatus calculated to supply exactly the loss it will sustain upon being separated from its mother; otherwise it must inevitably die upon being removed from that which had hitherto been the cause of its life and growth. Now the only system which appears at all fitted to answer this purpose is that of the brain and nerves."

Almost every possible variety of congenital defects has been recorded, and it is found that the duration of their existence has invariably been proportionate to the approach towards perfection which the brain and spinal marrow had attained.

"Some in whom there has been a spinal marrow and a small portion of brain have been known to live even for a week. Some, who have had no brain but a tolerably perfect spinal marrow, have lived a few days; while those who have had neither brain nor spinal marrow, have never breathed at all."

It is true, that in such monsters the heart, lungs, or ribs are rarely found perfect; but whether this be so or not—whether such fœtuses breathe or not at birth, is of no consequence to the present question, and does not increase the difficulty of understanding why they should move immediately after birth; because, being at that time only just removed from what had hitherto supported their growth and vitality, they are very nearly in the same condition as an animal from whose body these parts have been recently severed. Neither is there, according to Mr. Earle, any difficulty in comprehending why the first two varieties should occasionally exist a few days or even weeks; because the nearer they approach perfection, however distant from it, the better are they able to support and maintain, for a short time, the vitality which they possess at the time of birth; but such defective organization being insufficient to answer this purpose effectually, death must at length inevitably ensue. Where then, he exclaims, do we find in the circumstances attending the birth and death of these unhappy objects, any evidence which proves that the brain is not the source of nervous influence? Do they not rather offer the strongest possible proof, that unless there is an apparatus provided which is capable of supplying the place of that which is lost upon the fœtus being separated from the mother, it must inevitably die?

In regard to the second subject on which he supposes an important error has been committed by the supporters of the doctrine of irritability—the continuance of the action of the heart after the decapitation of the animal—Mr. Earle remarks, that the will during perfect health is always the power which calls the voluntary muscles into action, and that when the head is cut off, the will being at the same time removed, the muscles, after a few contractions caused by the injury to the spinal marrow as the knife passed through it, remain quiescent. But the case is very different with regard to the heart. Neither the will, nor any exercise of the intellect has any effect upon the contraction of that organ; hence the cause of its action is not removed when the head is cut off, and it ought not to be expected that the heart should cease to beat immediately upon removal of that which never had any effect upon it.

"In a few minutes, however, it does cease to beat, and then stimulants so often fail to excite any further contractions, that some have denied that it can be made to contract again. The heart is now said to be exhausted; but is this the case with the voluntary muscles? Certainly not; for as the cause of their action was removed with the head, they have remained at rest; consequently

they are not exhausted, and are still capable of contracting when stimulated. Now, supposing that the nerves of these muscles and the nerves of the heart each had their proper proportion of influence at the time of the removal of the head, the nerves of the voluntary muscles and the nerves of the heart would be in an opposite state as regarded their nervous influence; the one would be plus, the other minus, consequently the voluntary muscles will contract when stimulated, but the heart will not. When, however, the former have been exhausted by having been repeatedly excited to contract, they are then, but not till then, in the same condition as the latter, and neither can be excited to any fresh contraction." "It appears to me impossible to arrive at any other conclusion from these observations, than that the reason why the heart continues to beat a short time after the head of an animal is cut off, is because the cause of its constant motion is not removed by such an injury."

Mr. E. next proceeds to state the grounds upon which he considers himself justified in believing, that a something, which has been called nervous influence, is constantly emanating from the brain. As there are many who deny the existence of any fluid which comes from the brain and passes along the nerves, on account of its being invisible, the author thinks it necessary to refer to the phenomena observed in certain fishes. Some species of these are observed to have the power of generating, within their bodies, a subtile fluid, which for want of a better term has been called animal electricity, although the points of difference between it and chemical electricity are more remarkable than their points of analogy. Mr. Hunter long ago pointed out to the magnitude and number of the nerves bestowed on the electric organs, in proportion to their size, and thought it highly probable that they were subservient to the formation, collection, and management of the electrive fluid.

"When one of these fishes," says Mr. E. "has been much irritated the shocks which it gives gradually become so feeble as to be scarcely perceptible; but if he is allowed to remain quiet for a few hours, he is again capable of giving a very powerful shock. This fact proves that there is within the animal an apparatus capable of reproducing the electricity when it has been exhausted. It is impossible to suppose it can be restored by rest alone, for however long the animal might remain quiet, it would still be precisely in statu quo, unless some positive action had gone on *during* rest. Neither can it be imagined to have been reproduced by any action of the nerves themselves, because it cannot be supposed that this would have happened if their communication with the brain had been cut off by their division; but there is no difficulty whatever in attributing the reproduction of this fluid to an action of the brain, by means of which it may be gradually collected in the nerves; because such an opinion is in perfect accordance with so many well-established facts, which prove that the functions of the nerves are always affected in proportion to any extent of injury which may be committed upon the brain, and if formed by the brain it can arrive at the electric organs by no other conductors than the nerves belonging to them."

From these facts, as well as from the similarity of appearance of gases having widely different properties, and the invisible nature of caloric, Mr. Earle concludes, that the great difficulty of supposing the brain capable of forming any thing which can pass along the nerves without being seen, and can only be appreciated by observing certain phenomena which indicate its presence, is entirely overcome.

Many physiologists are of opinion that the brain is necessary to secretion, although the precise mode of its operation has never yet been satisfactorily ex-

plained. After remarking that there is great reason to believe that the whole secernent function, comprehending every thing relating to the growth and nutriment of the body, and particularly that part of it which constitutes the digestive process, is performed at least as well during sleep, if not better, than when the body is in motion, and that consequently the action of the brain by which this function is supported can never be at rest a single moment, Mr. E. remarks, that he considers this secernent function to be the result of an action of the whole brain. To this opinion he is led by two reasons: first, because it is proved by Dr. Philip, that the action of the heart cannot be affected by a stimulant, however intense, if it be applied to a small part only, while the motion of this organ is immediately increased when a stimulant is applied to any part of the brain, provided the extent of the surface stimulated is considerable; secondly, because the size of the brain is so small, as compared with that of the body, that it is scarcely possible to suppose that an action of a part only of this organ could be equal to the maintenance of all the vital functions. As the brain is constantly acting, it remains to be inquired in what manner this action is applied to fulfil its important office. As may be presumed, Mr. E. concludes that the nerves are evidently the only means by which it can be rendered available. Before entering fully on this subject, he presents his views respecting the proper classification of the nerves. After adverting to the classification proposed by Dr. Philip, and remarking that it is rather calculated to perpetuate errors than to render the study of the functions of the nerves less intricate, he remarks that the different functions of these, according to what is at present known of them, should form the basis of their classifications, and that they should be considered, first, according to the functions which each performs independently of the others, and secondly, according to their natural arrangement and the functions which they perform in combination. In accordance with this plan, he proposes that the term cerebral nerve, instead of being, as hitherto, applied to every one which passes through an aperture in the skull, should be restricted to the olfactory, ophthalmic, and auditory nerves, on account of their being more particularly connected wih the intellectual functions which are performed by the brain. Owing to these nerves being the most simple in their functions, that of transmitting impressions to the brain, and owing to their filaments not being intermingled with those of any other nerves, he proposes that they should form the FIRST CLASS. The SECOND CLASS comprehends every nerve by means of which muscles are subjected to the influence of volition. These are the anterior nerves, and belong to the anterior columns of the spinal marrow. The THIRD CLASS comprehends every nerve belonging to the posterior columns of the spinal marrow, transmitting impressions from their extremities to the brain. These nerves have protuberances upon them just before their respective junctions with the posterior columns of the spinal marrow. Lastly, the FOURTH CLASS comprehends every nerve proceeding from the sympathetic ganglions, and imparting to every tissue, whether of a muscular, (as the heart,) or of a fibrous, (as the arteries and iris,) texture, a power of motion altogether independent of any influence that the will can exercise.

"These four classes of nerves are found distributed in four different orders. The first class, or purely cerebral nerves, are the most simple in their arrangement, because their filaments are never intermingled with those of any other

nerve. These therefore should be considered as forming the *first order of distribution*. The next most simple arrangement is found in those nerves which are formed by the union of anterior and posterior filaments, or the second and third classes. These therefore should form the *second order*. These nerves supply the bones, muscles, &c. of the limbs and a great part of the trunk of the body; and those parts, whose structure is such as to allow of motion, and which can at any time be called into action by the will."

"The next variation is found in the union of posterior filaments with those belonging to sympathetic ganglions; or the third and fourth classes. These, therefore, should form the *third order*. All parts supplied by these nerves, whose structure is such as to allow of motion, such as the heart, arteries, intestines, and iris, are observed to be in constant action from birth till death, without becoming exhausted or fatigued, and without requiring rest. The action of these parts cannot be affected by the will.

"The last variation is found in those nerves which are formed by the union of anterior, posterior, and sympathetic filaments, or *second, third, and fourth* classes. These therefore should form the *fourth order*. The muscles supplied by filaments arranged in this order, are observed to have a power of supporting constant motion without fatigue, but they differ from those supplied by the third order in being always obedient to the command of the will. The nerves and function of the diaphragm affords an example of this variety."

The nerves belonging to the first of these orders are single, those belonging to the second and third are double, and those belonging to the fourth are treble. While some parts receive anterior, some sympathetic, and others filaments of both these classes, the posterior filaments are common to all. The reason is obvious; for whatever difference of motion may be required in different situations and structures, the maintenance of the healthy state of the various tissues is necessary to all parts, in order that they may be in a proper condition to act; and for this purpose posterior nerves are indispensably required.

Having disposed of this part of his subject, and stated that although the secernent function of the brain is the result of a physical action in it, he will postpone the explanation of it as well as of various other phenomena to a future work which he intends to lay before the public, Mr. Earle,—who seems to have adopted Reil's opinion, that the nerves of motion spring from the *cerebrum*, while the nerves of sensation eventually terminate in the *cerebellum*,—proceeds to state the precise manner in which he considers "the influence of the brain, or more properly the *cerebral influence*, because it proceeds from the cerebrum, and not from the cerebellum, is applied by the nerves in order to effect secretion, and to supply the voluntary and involuntary muscles with their power of contraction."

He remarks, that the action of the anterior nerves is always from the cerebrum towards their extremities, that of the posterior is exactly the reverse, being from their extremities towards the cerebellum; and that there is no instance in the whole body of an anterior nerve not being joined to a posterior nerve.

"This arrangement," he continues, "appears to be for the purpose of allowing the cerebral influence, which flows along the anterior, to return in a reflux direction along the posterior nerves and posterior columns of the spinal marrow to the cerebellum; thus completing a circulation as perfect as that which is carried on by the arteries and veins, and which I venture to call the CIRCULATION OF THE NERVOUS SYSTEM." It is to the passage of the cerebral influence, from the extremity of one nerve to that of another "analogous

to the passing of galvanism from the positive to the negative pole, that I am inclined to attribute the maintenance of the blood in its fluid state, the evolution of caloric, the secretion of synovia in the joints and bursæ, and, in fact, the support of the whole secernent function upon which the deposition of new and the removal of old parts depends. It is further to be observed, that as this circulation is constantly going on, there is always a certain quantity of cerebral influence in the anterior nerves, consequently all the muscles to which these nerves are distributed must always act in obedience to the will, simply because volition can affect their prime origins which are in the cerebrum."

As may be perceived no provision is made in the above arrangement for the supply of the viscera. This, according to our author, is effected in the following way. Every posterior nerve is provided with a ganglion, (which as they do not interfere with the transmission of external impressions, evidently perform some office which has not hitherto been understood,) in order that part of the current which is returning in a reflux direction along the posterior nerves, upon which alone these protuberances are found, may pass at regular intervals into the sympathetic ganglions. The secernent function of the viscera must be performed in the same way as in the limbs, and Mr. E. thinks that an opportunity is offered by the wandering course of the pneumogastric nerves, for the passage of the same fluid from the extremities of the nerves coming from sympathetic ganglions, to the extremities of nerves of an opposite character, at once providing for the whole secernent function of the viscera. As regards the rest of the returning current, which is over and above what is necessary for the supply of the viscera, it is supposed to pass upwards along the posterior columns of the spinal marrow into the cerebellum, supplying in its passage the spinal accessory nerves, so that the muscles to which they are distributed are endowed with the power of maintaining long-continued action without fatigue.

"Thus the physiology of these nerves, which at first sight appears so difficult of explanation, becomes a most convincing proof of the existence of a CIRCULATION IN THE NERVOUS SYSTEM. The superior cervical ganglion of the sympathetic is supplied from that on the pneumogastric precisely as the thoracic, abdominal and pelvic sympathetic ganglions are supplied from the ganglions on the posterior nerves which are in their neighbourhood."

The succeeding chapters of the first section are devoted to the consideration of the facts upon which the views we have just laid before our readers are founded. The author first examines the functions of the second order of nerves, and states his reason more fully than he had done before, for considering the muscles as dependent upon the nerves for their power of acting; or what other physiologists have denominated their irritability or excitability. The objections he presents to the Hallerian doctrine, or rather to Dr. Philip's views, for it is principally against this experimenter's conclusions that his criticism is aimed, are rather theoretical and argumentative than the result of counter-experiments; for throughout the whole of this chapter, he adduces but one single experiment amid a number of arguments tending to show the fallacies of the conclusions which Dr. Philip has drawn from his numberless vivisections. Some of these arguments are highly ingenious and deserve an attentive consideration; but we are not disposed to admit, that either they or the experiment he has detailed are calculated to make us refuse coinciding with those who recognise

the existence, in muscles, of an inherent power of excitability, independent of any influence imparted to them by the nerves. But be this as it may, his principal reasons for believing in the necessity of this influence are—that when animals are deprived of life by lightning or by any poison which suddenly affects and destroys the nervous system, the muscles cannot be stimulated to contract after death, and that there is no experiment which goes the length of proving, that muscles when exhausted can recover their power after the division of their nerves; whereas when the nerves remain entire and uninjured they recover that power after being considerably exhausted by frequent contraction.

Mr. Earle next inquires, in a particular manner into the functions of the third order of nerves—those composed of posterior filaments with branches belonging to the sympathetic ganglions, and which supply the heart and vessels of circulation. He selects a few of the most decisive of the experiments detailed by Dr. Philip, and from which that gentleman had thought himself justified in concluding that the action of those organs is independent of the brain. His object in selecting those experiments is to show the difference of effect produced, by destroying suddenly, or slowly, or by wholly removing the brain and spinal marrow, both in warm and cold-blooded animals; and that all involuntary motion is injured in proportion to the degree of injury committed upon the nervous system—a circumstance from which he concludes, that no further evidence is wanting to prove that involuntary, as well as voluntary motion, is entirely dependent on an influence derived from the brain, and that the nerves themselves have undoubtedly an action to a certain extent independent of the brain and spinal marrow, precisely as the minute vessels of circulation have an action to a somewhat similar extent independent of the heart. These opinions are, he thinks, strongly corroborated by the observations of Flourens and Marshall Hall, who have taken notice of the gradual cessation of the circulation which follows the careful removal of the brain, commencing in the most minute extremities of the blood-vessels, where provided the brain be the original source whence the nerves derive their influence or power, it is in the failure of the action of these minute vessels, on account of their being most distant from the brain, that we should naturally expect the effect of its removal would be first perceptible.

"In thus ascending from effects to causes, it is found, that the brain is the source whence the influence of the nerves is derived, and that these again have the power of distributing it for a short time after the removal of the brain so long as any influence remains in them, precisely as they did before the connexion was interrupted; but it must not be forgotten, that the moment at which the brain is either removed or destroyed, is exactly the time at which the failure of all motion commences. These facts and observations lead to the inference, that the same relation subsists between the brain and nerves, as between the heart and arteries; the brain being the source whence the nerves derive their influence, the heart the source whence the arteries derive their supply of blood."

Mr. Earle is of opinion, that the experiments which Dr. Philip instituted to show, that the action of the heart and vessels of circulation may be influenced by stimulants and sedatives applied to the brain and spinal marrow, prove the fact sufficiently well. On this subject he makes the following remarks.

"The terms stimulant and sedative are used to express nothing more than

increase and diminution. At the time of the commencement of these experiments the heart was beating, and the application of either the one or the other to the brain or spinal marrow excited no new action either in the brain or in the heart, but simply caused an increase or diminution, or in other words, a variation of what already existed. As the increased or diminished action of the heart was the result of a corresponding action of the brain caused by the application of either agent, so the ordinary action of the heart is necessarily caused by the ordinary action of the brain, and as the former invariably ceases to beat soon after the removal of the latter, it must be concluded, that so long as the heart is acting in the perfect animal, the brain is acting also."

Mr. Earle next inquires into the dependence of the secernent function on the nervous system. This function, he remarks, comprehends, besides the formation of particular secretions and excretions, the growth and nutrition, the deposition of new and the removal of old parts throughout the whole body. As the blood is evidently the fluid from which all functions are formed, the first step in this inquiry is, he thinks, to ascertain the cause of its fluidity. On this subject, to which he appropriates a separate section of his work, he adopts the conclusions of Dr. Wedemeyer, who regards the cause of this fluidity to be dependent upon an influence of the nerves upon the blood. He enters into a long discussion to prove that nervous influence and galvanism are not identical. He adopts the views of Wedemeyer and other anatomists who maintain that the blood in the finer capillaries no longer flows within actual vessels, whose parietes are formed by a membranous substance distinguished from the adjoining cullular tissue by its texture and compactness; but in simple furrows or canals, whose walls are formed by the surrounding cellular tissue; and remarks, that while these observations appear decisive as to the place in which secretions are formed, the fact, that small arteries receive an increased supply of nerves in proportion as their size diminishes, seems to point out, in a manner scarcely to be misunderstood, the power by which secretions are formed. He inquires whether this function is performed exclusively by the third order of nerves, or by the sympathetic system; and comes to the conclusion, from the results of the experiments of Magendie on the fifth pair, and of others on the pneumogastric—

"Not only that every posterior nerve is concerned in performing secretion, but also, that the economy of the sympathetic ganglions has more relation to the means whereby the motions of the parts supplied by them may be constant and independent of the will, than to any difference of secernent function."

On the subject of the cause of animal heat he adopts the opinions of those who attribute this phenomenon to the influence of the nervous system, and quotes from Mr. Adelon's elaborate work on physiology, a detail of the experiments of Mr. Chossat, of Geneva.

That part of his work on which Mr. Earle seems to attach most importance, is that in which he inquires into the "*mode in which by means of the nerves* THE CEREBRAL INFLUENCE is rendered available in maintaining the MOTOR *and* SECERNENT FUNCTIONS *of the animal economy.*" In this section and in the succeeding he endeavours to sustain the theory laid down in his first chapters respecting the circulation of the nervous system, and the manner in which the sympathetic nerves receive their portion of nervous influence—a theory of which we have already offered a sketch. Without entering here into any details upon this subject, or examining the grounds upon which he endeavours to establish his

views, we may remark that the whole theory appears to us to be more fanciful than plausible, and to rest more on speculation than on the result of close observation and well-devised experiments.

There is no doubt, and it did not require the work under review us to apprize of the fact, that there exist nerves whose office is to convey the influence of the will from the brain to the muscles—and others destined to carry to the brain a knowledge of impressions made on surfaces of relation, or in the substance of the tissues; but we may reasonably doubt that things take place exactly as Mr. E. describes them.

Mr. E. starts from the fact, that the anterior branches of the spinal marrow are nerves of motion, and the posterior nerves of sensation, and that the same facts are also proved by experiments upon the anterior or posterior columns of the spinal marrow. It is thus plainly demonstrated, he remarks—

"That the influence of the will or of the brain cannot be transmitted to the voluntary muscles through the posterior columns or the filaments belonging to them; and that external impressions cannot reach the brain through the anterior columns or the filaments arising from them; any influence or impression so conveyed by either set of nerves would be retrograde, and contrary to their usual fixed mode of action, from which they cannot deviate. There is no action, therefore, in an anterior filament, except *from the brain to its extremity;* neither is there any action in a posterior filament, except *from its extremity to the brain.*"

Our readers will immediately perceive that this is taking for granted, as a fact proved beyond the possibility of doubt, a circumstance on which the ablest physiologists and experimenters are yet undecided, and which even if true would not prove the correctness of Mr. E.'s theory, but only afford us clearer views than we possessed respecting the precise origin and termination of the nerves of motion and sensation. The question is whether there is a constant passage of a fluid from the nerves of motion to the nerves of sensation—whether that fluid is the same in both orders of nerves. Now it may be objected to Mr. E.'s theory that if it is the same fluid which goes down one nerve and up another, we should be at a loss to explain how these two nerves can be enabled to perform functions of a very different nature, and that if we admit that the same fluid which going up towards the brain along a nerve of sensation, imparts motific power to another set of nerves which it encounters in its way upwards—the sympathetic and the accessory nerves, the difficulty would be rendered still greater. All this certainly is not very clear. In his opinion the precise mode in which the cerebral influence is rendered available for the accomplishment of the whole of that part of the secernent function upon which the growth and nutrition of the body depends, is easily understood; and is well illustrated by the well-known fact, that galvanism exerts its influence upon chemical substances in passing from the positive to the negative pole: but this is merely a supposition, and leads to no conclusion. In adducing arguments in proof of the existence of the circulation of the nervous system, such as he understands it, he makes the following remarks, which may not, perhaps, appear as satisfactory and conclusive to all our readers, as they do to himself.

"As I know of no reason which should induce me to suppose that this circulation does not exist, nor of any physiological fact or experiment which proves, that it is incompatible with the more obvious functions of the nerves relating to volition and sensation, and therefore cannot take place, I think that I am

justified in believing that there is a circulation in the nerves of a subtile fluid somewhat similar to electricity, passing as regularly and uninterruptedly along them from and to the brain, as there is of blood in its vessels from and to the heart."

In a chapter on the functions of the fourth order of nerves, or that formed by a union of anterior, posterior, and sympathetic filaments, Mr. Earle contends for the existence of a distinct class of muscles, differing from the voluntary and involuntary in the circumstance, that, though like the former, they are entirely subject to the regulation of volition, their action is continual, and they never require rest.

"The power of the will," he says, "over these muscles is only exerted occasionally as convenience or necessity may require, and is employed solely in increasing their action; but volition has no more power of stopping or preventing their action, than it has of interfering with that of the heart."

The muscles of the face, the intercostals, and the rest of the respiratory muscles, belong to this class. Mr. E. remarks, that the cause of this peculiarity in the action of these muscles is not to be either found or sought for in any difference in their structure, any more than in that of the purely voluntary or the purely involuntary muscles, but in the nerves by which they are supplied. He calls attention to the fact, that this class of muscles is supplied by the fourth order of nerves—that their involuntary action is provided for by means of branches from sympathetic ganglia—that they are subject to the will through the anterior nerves; and that they have posterior filaments, in order that the healthy condition of their structure, upon which their fitness to act depends, may be constantly maintained. This order of nerves is very numerous, and extensively distributed. It comprehends the third, fourth, fifth, sixth, portio dura of the seventh, glosso-pharyngeal, the primary branches of the pneumogastric, the ninth, and the anterior branches of all the spinal nerves, with the exception of the fifth, sixth, and seventh cervical.

"Considerable attention has been paid to some of the nerves of this order in consequence of the publication of Sir C. Bell's opinion respecting those which he has termed 'respiratory.' The basis upon which these peculiar opinions rest, appears to be the idea of there being a certain part of the superior portion of the spinal marrow expressly devoted to the regulations of the motions of respiration, 'a tractus respiratorius,' and that every nerve belonging to this tractus is especially destined to combine and assist in the performance of respiration, as a necessary consequence of its connexion with that particular part. I have found it impossible to adopt these views, for the following reasons: First, it is by no means clear that the tractus respiratorius has any existence: Secondly, some of the nerves termed respiratory arise from the anterior, others belong to the posterior, while the phrenic belong equally to both columns of the spinal marrow. These facts are altogether subversive of their arising from any one particular part; lastly, in classing the pneumogastric as a nerve of motion, Sir Charles is at variance with the results of his own experiments, which show that no posterior ganglionic nerve has any thing to do with motion."

The last nerves which Mr. E. notices, are the spinal accessory nerves. Though last, he says, they are the most important as regards the proof they afford of the existence of the circulation of the nervous system. He relates an experiment of Sir Charles Bell, who states, that if we expose this nerve, and

then induce excited respiration, so as to bring the mastoid muscles into powerful action in combination with the other muscles of respiration, and if, while this action is performed, we divide the nerve, the motion ceases, and the muscles remain relaxed until the animal brings them into action as voluntary muscles.

From this he concludes, that, without entering into any speculation on the respiratory functions of these nerves, it is evident that they bestow a power of involuntary motion upon the mastoid and trapezius muscles. There is a great necessity for this muscle having a power of involuntary motion to enable them to act constantly without becoming fatigued in moving and supporting the head, a function which muscles, supplied only by anterior and posterior nerves, would be by no means equal to.

"It is to be observed that the spinal accessory differs from all the rest of the nerves which belong to the posterior columns of the spinal marrow in several points. First, the most obvious difference is in the direction of the course of their filaments, which is from below upwards. The second is in their having no protuberance or ganglion upon them, either before, or at their emergence from their bony canals. The third in being motor nerves. They further differ from the rest of the posterior nerves in that, as the motor power which they bestow upon their muscles must be derived from the spinal marrow, *they arise from*, while the latter *terminate in*, the posterior columns." "The only point which now remains to be explained, is how they receive the influence which they bestow upon the muscles. The direction of the course of their filaments precludes all idea of their influence being directly derived from the brain, even if the fact of their being involuntary did not discountenance such an opinion. It must therefore come from the posterior columns of the spinal marrow, and unless there is an upward returning current along these columns towards the cerebellum, the physiology of these nerves is absolutely inexplicable; but if there is such a current as that which I have endeavoured to show the nervous system is well adapted to carry on, it is precisely that which is most admirably calculated to provide a supply of nervous influence; constantly, because the action of the brain is constant; and involuntarily, because the will can have no power over the nerves along which it flows. According to this explanation, all the difficulties which have hitherto appeared to present insuperable obstacles, and to baffle every attempt to elucidate the physiology of the spinal accessory nerves, actually combine to afford the most beautiful confirmation of the existence of the circulation of the nervous system, which could possibly have been imagined."

We have thus endeavoured to present in as concise a manner as possible some of the facts and inferences which have induced Mr. Earle to believe that there is a circulation in the nerves, and that instead of there being several separate and independent vital powers, there is but ONE, upon which every function necessary to the continuance of life depends; so that all the various phenomena result not from the exercise of different powers, but from a difference in the mode of the application of one and the same power. From what we have already stated in the course of this article, it may be seen, that we are not prepared to acquiesce in all the views of our author. We might, had we time and space sufficient at our disposal, show that on several other points besides those adverted to, the positions he assumes are very far from conclusive, and that he has particularly erred in respect to the functions ascribed to the pneumogastric nerve; but as the consideration of these subjects would lead us further than we can conveniently go, we must abstain from it. We close our analysis with the

remark, that the work before us affords evidence of considerable talent in the author, and induces us to hope that Mr. Earle will soon favour the medical profession with his promised volume on the function of the brain, but that we have been at a loss to discover in it those great discoveries—those very new views concerning the functions of the nervous system which were so pompously proclaimed in the commencement and in other parts of the work. The only novelty, perhaps, is the supposed existence of the nervous circulation, and the mode in which the sympathetic and accessory nerves are furnished with their portion of power. These views, however, as has been seen, are far from being very satisfactory. As regards the continuance of the influence of the brain on the heart and viscera even in the ordinary state of existence, and the property of the sympathetic, to remove, under particular circumstances, the organs from under the controul of the will, which at ordinary periods are subject to its influence, and to enable them to continue their action without repose, Mr. E. has been anticipated by many physiologists, and among them by M. Broussais, whose writings should be in the hands of every physician, and cannot, we may presume, be unknown to Mr. Earle. L.

XVI. *Nouvel Aperçu sur la Physiologie du Foie et les Usages de la Bile. De la Digestion Considérée en Général.* Par Benjamin Voisin, D. M. P. Paris, 1833. pp. 146.

New Observations upon the Physiology of the Liver and the Uses of the Bile, and upon the General Subject of Digestion. By Benjamin Voisin, M. D.

Although we cannot accord the appellation novel to all the observations of M. Voisin, in relation to the physiology of the liver and of the digestive organs generally, they are nevertheless in the highest degree interesting. He has, it is true, advanced a few opinions in the course of his essay, the correctness of which will admit of very considerable doubt, but generally speaking his conclusions are based upon numerous facts and experiments, from which they appear to be legitimately deduced, while they certainly afford a much more satisfactory explanation of the several disputed points to which they refer, than those adopted by the majority of physiological writers.

As we have just hinted, many of the observations of M. Voisin are rather old opinions revived than original suggestions of his own. The credit is due to him, however, of placing them in a somewhat novel point of view, and of illustrating them by a variety of interesting and appropriate facts and experiments, in the collection and performance of which he has exhibited no little industry and skill.

The primary subject to which the observations of the author refer is the physiology of the liver. To this the first five chapters of the essay are devoted, and it is again repeatedly referred to in the subsequent part of the work.

The liver M. Voisin considers to be a secretory organ, the office of which is the depuration, not only of the venous blood, but also of the chyle, previously to the entrance of the latter into the thoracic duct. The bile, he maintains, is purely excrementitious and composed of the effete particles of the organs carried into the circulation by the absorbents, and of certain substances taken up by the lacteals with the chyle, and which are not adapted to nutrition. He ad-

mits, however, that the bile may act as the natural and necessary stimulus by which the peristaltic motion of the intestinal canal is excited and kept up.

In reviving thus the ancient, but by no means exploded, opinion that the liver is in fact the primary organ of hæmatosis—in other words, that by its action a species of purification is produced in the chyle, by which the latter is rendered more fit to mingle with and form a part of the blood—M. Voisin has attempted to establish its correctness by showing that all, or at least the major part, of the lacteals, before they empty their contents into the thoracic duct, pass through the substance of the liver.

The lacteal absorbents, he remarks, after passing a certain distance, anastomose with each other, enlarge in size, and are collected together so as to form a kind of plexus below the lobe of Spigelius, towards which they converge. From this point they penetrate into the substance of the liver, through which they ramify with great minuteness, and finally empty themselves into the reservoir of Pecquet.

"To prove that the chyliferous vessels do pass through the liver, in their course to the thoracic duct, it is only necessary to put a ligature around the latter below the diaphragm, in a dog, after he has partaken of a large quantity of food, and when digestion is presumed to be in full activity. The lacteals will then swell and become very apparent, their whitish colour being distinctly perceived. In consequence they may, without much difficulty, be traced from the interior of the intestinal canal, through the mesenteric glands, until their entrance into the liver."

The foregoing opinion in relation to the course of the lacteals through the substance of the liver, is one which appears to have been entertained as early as the period when those vessels were first discovered. Asselli, who in 1622 detected the chyliferous vessels in quadrupeds, denominated them chylous veins, and describes them as terminating, like the other veins of the intestines, in the liver. Subsequently, Weslingius, who discovered the same vessels in the human subject, and traced them in their course towards the thoracic duct, states that a large number of them penetrate the liver.

The ancients, who believed that the chyle underwent in the latter organ certain changes, referred its conveyance thence not to the lacteals, but to the mesaräic veins. This opinion has been revived and advocated by several distinguished physiologists of the present day, among whom we may name Magendie, Gmelin, Tiedemann, and Ribes.

The spleen is considered by M. Voisin as an appendage to the liver. Its principal use being to receive and to furnish to the latter blood containing those materials which enter into the composition of the bile.

The heart, by means of its columnæ corneæ, causes, according to our author, a separation of the arterial blood into two distinct portions, which, however, circulate in the same vessels, side by side, but without mixing with each other. The one portion, the most pure, the most aerated, and the lightest, passes into the aorta to the left, and when it arrives at the arch of that vessel is thrown into the three principal branches that are distributed to the superior parts of the body. The other portion, less pure and heavier, is conveyed to the abdominal organs and inferior extremities.

This latter portion of the blood, in its passage through the several secretory organs placed along its route, is deprived of certain of its ingredients, and in

consequence of this successive purification, when it arrives at the lower parts of the body, will be found to differ but little from that which is distributed to the superior organs.

The more impure of the two portions into which the arterial blood is supposed to be divided by the heart, is composed, according to M. Voisin, principally of the chyle newly transformed into blood, and which has undergone but once the process of hæmatosis. It is not adapted, therefore, for the support and vivification of the more important organs, and especially of the brain, until it has been more fully assimilated in its nature to arterial blood. This second process of hæmatosis it is the office of the liver to effect.

This fanciful notion of the division of the arterial blood, by the heart, into two distinct portions, our author attempts to prove by direct experiment. Into the left cavities of the heart of a dog, immediately after the animal had perished from hæmorrhage, he forcibly injected at one and the same time, two fluids differing in colour and consistency; the most fluid being blue, and the other red. On opening the heart and aorta, it was found that the two fluids remained side by side unmixed; the blue occupying the left portion of these organs and filling principally the arteries distributed to the head and superior parts of the body, while the red occupied the right portion of the cavities of the heart and aorta, and was found to fill the abdominal aorta and its branches.

If this division of the arterial blood into two distinct portions be admitted, remarks M. Voisin, it will be seen that the liver, the spleen, the intestines, and nearly all the abdominal viscera, receive a blood, not less nutritive perhaps, but less pure, less homogeneous, than the other parts of the body, but at the same time of a quality which is precisely that adopted for the formation of their various excretions.

The blood which is returned from those organs which separate from it excrementitious fluids is, in consequence of the elemination of the latter, in a state fit for mixing immediately with the common mass of the venous blood. That which is transmitted to the inferior cava by the hepatic and renal veins is of this kind; but that returned from the spleen, having undergone no depuration, cannot return directly to the heart, it must previously pass into the liver and be there deprived of those elements which serve for the formation of bile.

The spleen, then, is an organ for the circulation of the blood the least hæmatosed, upon which it has scarcely any other effect than to change it from arterial into venous.

The large size of the splenic artery, its origin from the cœlic trunk, (*opisto gastrique,*) immediately after the entrance of the aorta into the abdomen, and its distribution through a spongy tissue, cause the spleen to be one of the first and principal centres of fluxion for the blood upon its passage from the heart.

The blood of the splenic vein is, according to our author, of a peculiar character. It has already the oily nature of bile, and appears to be composed of the debris of the organs.

To prove that the bile is not necessary for the separation of the chylous from the excrementitial portion of the chyme in the duodenum, M. Voisin adduces, 1stly. The fact that there are animals which are destitute of any organ analogous to the liver, and yet digestion and assimilation are performed in them as perfectly as in such as possess that organ.

Lieutaud, in his Medical Anatomy, (*Lib. I.* 190,) reports an observation of Gaspard Bauhin, under the title '*Hepar deficiens.*' It refers to an individual in the body of whom, after death, no trace could be found of either liver or spleen. The parietes of the intestines were very thick and fleshy, and upon them terminated the branches of the vena portæ. 2dly. That the opening of the ductus choledocus into the duodenum, by which some consider the importance of the bile in chylification to be established, is not invariable in all animals; in some of the inferior classes the excretory duct of the biliary apparatus opens near the anus, which proves that in such animals at least the bile is a mere excrement. 3dly. That the functions of the liver are active in the fœtus before the digestion of food can take place.

"The blood brought from the placenta by the umbilical vein, although arterial, is not, however, sufficiently pure to be distributed immediately to the delicate organs of the fœtus. In passing through the uterine vessels and the placenta it loses in some degree its vivifying properties, and acquires, in part, the properties of venous blood, becoming more gross and oily, and charged with hydrogen and carbon. Of these it is necessary that it should be deprived in the vessels of the liver, which latter acts, in regard to the fœtal blood, the same office nearly as the lungs do in the adult."

The secretion furnished by the liver in the fœtus is the meconium. In examining the composition of the dark-coloured, viscid paste found in the bowels of new-born infants, we find it to be composed of the same elements as the bile. Portal states positively that the meconium is nothing else than bile, and according to the analysis of Vauquelin it is bile mixed with mucus. Thus we find that before as well as subsequent to birth the bile is purely excrementitial. That in the fœtus it is not concerned in chylification is proved by the fact that no chyle is then formed. We can readily conceive that after birth, when the digestive function is fully established, there must necessarily be a considerable difference in the quantity as well as in the quality of the materials separated from the blood by the liver, and consequently in the amount and composition of the bile secreted.

4thly. M. Voisin has attempted to show that the bile is not concerned in the formation of the chyle, by numerous pathological observations, in which, from disease of the liver, the secretion of bile was greatly diminished or entirely suspended, or in which its entrance into the intestines was prevented completely, and yet digestion and assimilation experienced little or no interruption.

5thly. By direct experiment he has shown, that the occlusion of the common duct of the biliary apparatus does not prevent the formation of chyle; provided the passage of the pancreatic fluid into the intestine is not at the same time prevented. In a number of dogs a ligature was applied around the ductus choledocus, so as completely to prevent the entrance of the bile into the intestines. Two of the animals lived three months after the experiment, three survived six weeks, and five died shortly after the ligature was applied; in no instance was death produced by the suspension of digestion or assimilation. Almost all the dogs had commenced to eat, and in the majority there was found in the duodenum food perfectly chymified, and well-elaborated chyle in the lacteals. In one instance, the hepatic and cystic ducts and gall-bladder became enormously distended with bile, and death was occasioned by the rupture of

the coats of the gall-bladder and the escape of the bile into the peritoneal cavity. With the exception of extensive inflammation of the latter, no disease of the abdominal viscera was detected. The stomach and intestines were filled with aliment almost entirely digested, and the lacteals were distended with chyle. Of the latter nearly half an ounce was procured.

Having disposed of the physiology of the liver, and the inquiry into the uses of the bile, M. Voisin considers next the subject of digestion in general. His remarks and experiments in relation to this important process of the animal economy are deserving of very considerable attention. It is not our intention, however, to give, on the present occasion, any thing more than a very brief sketch of our author's views in relation to the various points connected with it; merely noticing, as we pass along, the nature of his experiments and their results.

M. Voisin denies that the process of digestion, properly speaking, is confined solely to any one portion of the alimentary canal. From its entrance into the mouth, until the last portions of nutritive matter are completely separated from those which are excrementitial, in the lower part of the intestinal tube, he insists that the aliment is continually acted upon, and undergoes a succession of changes, the sum of which constitutes the process of digestion. The action of the stomach and its juices, is, he admits, of the very first importance, but by no means, as he has attempted to prove, essential to chylification. Digestion, under ordinary circumstances, during a healthy condition of the body, commences in the mouth, and terminates only when the contents of the intestines have arrived in the rectum.

The identity of organization of the different portions of which the digestive tube is composed, proves, he remarks, that they all assist in producing in the food those changes which are necessary for the separation from it of its nutritive principles, while it enables, also, one portion of the apparatus to supply to a certain extent the defective action of another.

During the short time the aliment remains in the mouth, it undergoes, according to our author, a very important modification. Its texture is broken down by the teeth, and, at the same time, it is intimately mixed with the salivary fluids. In consequence of these acts, its appearance and composition are in a great measure changed. Although the different particles of which the food was composed are still recognisable, yet, after the latter has undergone this, as our author terms it, "first digestive elaboration," they have become much more homogeneous.

The change produced in alimentary substances by commixture with the saliva, M. Voisin maintains, do not, as some suppose, consist in a simple mechanical division and their conversion into a soft paste, by which their deglutition is facilitated; it is something more. By mastication and the action of the saliva, a commencing decomposition is produced in the food. It is well known, that the articles of food which have been the most completely masticated and combined with the saliva become most promptly chymified in the stomach; and when, in place of being swallowed, they are rejected from the mouth, they become sour and putrify in a very short time; which facts M. Voisin adduces as proofs of an actual and very important change having been effected in their composition.

The author submitted food to the action of the saliva at a temperature similar to that of the human body, and found that when the latter was slightly acidified the same changes occurred as are produced by the action of the gastric fluid under similar circumstances.

The food having arrived in the stomach, it is subjected there to the action of that organ and its juices, by which, in a shorter or longer time, according to its nature and other circumstances, it is converted into chyme.

M. Voisin admits the existence of a gastric solvent. Nothing, he observes, disproves the possibility of the secretion of a solvent fluid from the coats of the stomach taking place, at the moment the aliment enters that viscus, in consequence of the peculiar excitation which the latter receives from the presence of the food.

Artificial digestion, as it is termed, although very far from representing exactly that which takes place in the stomach, nevertheless proves very fully, he conceives, the solvent action of the gastric juice.

"Like all the other products of exhalation, the action of the gastric solvent cannot be separated from that of the organ by which it is furnished. Its influence, as we may well suppose, is subordinate to the vital action of the stomach. It is in consequence of its particular state of sensibility and vitality during the period of digestion, that the latter is enabled to furnish a fluid adapted to the solution of the food which it contains, and consequently therefore to its conversion into chyme."

Hence, according to M. Voisin, the process of chymification is a complicated one, in the performance of which, he insists, we cannot separate the action of the stomach upon the food from that of the gastric juice, and *vice versa*. The stomach is the organ to which the important act of chymification is confided, and the gastric juice a mean placed at the disposal of that organ to enable it to perform its functions.

The gastric juice penetrates, liquefies, and combines with the different articles of food, altering completely their character, and changing their intimate composition, so that they are no longer recognisable. In effecting this change, the gastric fluid is aided by the stomach, which is by no means an inert receptacle, but, on the contrary, takes a very active part in the act of chymification.

According to the observations of M. Voisin, the gastric juice is not supplied merely to an extent sufficient for the solution of the food taken into the stomach, but is always in excess. "It is far," he also remarks, "from being identical in its properties in all species of animals; it is not so even in the same animal at all times, as Chaussier has very clearly shown. It differs considerably according to the nature of the food which is eaten." It is sometimes eminently acid; in other cases it is more or less alkaline, changing to green the syrup of violets and other vegetable blues. These facts, M. Voisin states, he has verified by numerous experiments.

"The possibility of my being able to establish in a manner so positive, the character of the gastric juice, under the different circumstances referred to, will, he remarks, no doubt be contested; and this in consequence of the difficulty of obtaining the fluid during the period of digestion, and of separating it perfectly from the food, which might possibly communicate to it an alkaline property, and hence impair the correctness of the experiments. I will merely

state in reply, that when I have desired to test the properties of the gastric juice, I have always experimented with that fluid, when I was certain that it was pure and without foreign admixtures, such as was furnished by an animal to which, after fasting, food was presented, and by that means the exhalation of the gastric juice produced."

The observations of M. Voisin confirm those of Chaussier, Wilson Philip, and numerous others, in proving that chymification always takes place from the circumference of the aliment contained in the stomach by successive layers.

During digestion, remarks our author, the stomach does not remain quiescent; it contracts in a manner continuously, pressing in every direction the food, and after a movement of peristole, which pushes the contents of the organ from its splenic to its hepatic extremity, and from the latter back again, it causes it finally to pass to the pyloris, the resistance of which is overcome, and the chymified portion of the food passes into the duodenum.

The changes which the chyme undergoes in the upper portion of the small intestines are difficult to detect. Every thing induces the belief, according to our author, that they are very analogous to those which take place in the stomach; but what agents, what fluids produce those changes in the duodenum, we are as yet entirely ignorant. Most physiologists are of opinion, that they are effected by the action of the pancreatic juice and the bile, with which the chyme is there combined. That bile, at least, is not essential to chylification, M. Voisin, as we have seen, has attempted to prove, and as we conceive, he has established the fact in the most conclusive manner. In addition to the arguments on this subject already referred to in his chapter on digestion; in the duodenum, he remarks, if the bile be really concerned in chylification, and is the agent by which the chyle is separated from the chyme, the results obtained by testing its action upon the latter out of the body ought to be even more striking than those from the action of the gastric fluid upon food. He however undertook a number of experiments to ascertain the effects produced by the bile upon the chyme, but no chyle could in this manner be produced, nor in fact any change which was not referrible to the sensible properties of the bile.

According to Haller, the changes in the chyme necessary to the separation from it of the elements of the chyle, are produced by the action of the fluids secreted by the intestines in the same manner as the changes which the food undergoes in the stomach are effected by the fluids of that organ. This opinion, founded upon the resemblance, or rather perfect identity of the gastric and intestinal fluids, and the little difference in the appearance of the chyme during its continuance in the duodenum, has, according to our author, very strong presumption in its favour. By conceding its truth, we admit the vital action of the intestines, while by the received opinions, this is entirely lost sight of. M. Voisin conceives that the pancreatic juice has likewise a very important agency in effecting the separation of the chylous from the excrementitious portions of the chyme.

To prove that the solvent properties of the intestinal fluids are similar to those of the gastric juice, the author, from the intestines of animals kept some time from food, procured a quantity of mucus, in which, slightly acidified, he immersed portions of flesh, and kept the mixture at a temperature equal to that of the living body.

"At the end of from twenty-four to thirty-six hours, the flesh was in general converted into a grayish somewhat homogeneous paste. Vegetable substances however, particularly the herbaceous, experienced no change. To effect *completely* the change of the aliment into a chymous pulp, about six hours were required."

In another series of experiments he introduced into the small intestines of animals a portion of aliment, in the one case masticated and mixed with saliva, and in the other without any preparation, and found that in a few hours in the first instance, and after a longer period in the second, it was as completely chymified as if the process had taken place in the stomach. The same experiments were repeated upon animals in which the pylorus was secured by a ligature, with similar results. One of the animals lived for a month after the pylorus was tied, being nourished during that time by the food introduced into the duodenum.

"As we approach the inferior portion of the ileum, the digestive powers of the intestinal tube will be found gradually to diminish; chymification and especially the absorption of chyle, requiring a longer time for their accomplishment than in the superior portion of the digestive canal, either from the intestinal fluids being furnished with less abundance, or rather because the absorbent surface is here less extensive, and supplied with fewer chyliferous vessels. However we have no reason to doubt that chymification, though less prompt, is nevertheless completely effected, for its most immediate effect, the formation of chyle, is still evidenced. We have recognised the latter fluid in the lacteal vessels and thoracic duct, when it could not have been derived from any other source than the absorbents of this part of the intestinal canal, a ligature having been applied so as to cut off all communication with the upper portion of the small intestines."

In the cœcum, ascending colon, and a part of the transverse arch of the latter, chymification is still performed, though less perfectly, and the few chyliferous absorbents which exist in this part of the canal, separate from the aliments its nutritive principles. The fact of the formation of chyme in the cœcum and colon is proved by experiments performed by introducing food into these intestines after the ileo-cœcal valve had been closed by ligature.

Thus we perceive that in the different portions of the alimentary canal the food is subjected to numerous successive transformations. That by the action upon it of the saliva, of the mucous and follicular exhalations, the gastric juice, the pancreatic liquor, the intestinal fluids, it is softened, chymified and changed in such a manner as to adapt it for the formation of chyle, while the remaining unnutritious portion becomes by degrees converted into excrement. In fact, remarks our author, this last process of digestion does not occur excepting in aliment that has undergone chymification. Those parts of the food which remain unacted upon by the digestive organs, and of their fluids, are rejected in precisely the same state in which they were taken into the stomach, and do not properly constitute the feces, but are mixed with them.

Although digestion properly speaking is a complicated process, which may be divided into successive periods, it nevertheless presents throughout a perfect unity of action to which concur one and the same class of agents. The same mucous membrane, similar in its texture, sensibility and mode of vitality, extends from the mouth to the anus, and which we have every reason to believe possesses a perfect similarity of function throughout its whole extent.

Digestion consists, therefore, according to our author, in the breaking up of the texture, the solution and preparation of the aliment by mastication, and the different fluids furnished by the mouth, stomach, pancreas and intestines, so as to enable the chyliferous absorbents to separate and remove from it those elements which enter into the composition of chyle. That this separation and removal of nutritive particles from the dissolved and decomposed food commences in the stomach, is peculiarly active in the upper portion of the small intestines, and though still effected, becomes less and less as the chyme passes along the intestinal tube, until it is finally reduced to pure excrement in the rectum. That chyle is formed by the vessels of the stomach, is proved by the experiments of M. Voisin. If we open the stomach of an animal two hours after it has eaten, he remarks, when we suppose that digestion is in full activity, we observe upon the surface of the chyme a fluid of a grayish-white, the same as in the duodenum; if by a ligature we arrest the course of the fluids through the gastric absorbents, these will become swollen and enlarged, and by dividing them we procure a white liquid, which is precisely similar, excepting that it is rather more serous, to that obtained from the same order of vessels which have their origin in the duodenum.

"I have nourished during fifteen days a dog, around the duodenum of which I had passed a ligature immediately below the pylorus. Its appetite for food was excellent, the animal eating frequently, but little at a time. As soon as the stomach had separated the nutritive principles of the food, the remainder was rejected by vomiting, or rather by a kind of regurgitation. It is proper to remark that the rejected portion was less altered, less excrementitial than if it had been discharged after passing through the whole length of the intestines."

"The existence of chyliferous vessels in the stomach being well established, the formation of chyle in that organ cannot be questioned. It hence follows that the presence of bile is not indispensable to the accomplishment of chylification."

The remaining chapters of M. Voisin's essay are devoted to an examination of the morbid affections of the liver, with a view of deriving from them evidence of the nature and uses of the bile. The author presents some very interesting views of the pathology of the liver, and particularly of the causes of jaundice. Of these, however, we cannot on the present occasion present any thing like a satisfactory sketch, and shall therefore be obliged to close here our notice of the very interesting and in many points of view important observations of the author. His views of digestion are generally speaking highly plausible, and we are convinced will be found correct when tested by a series of experiments similar to those reported in the essay before us. D. F. C.

XVII. *Dictionary of Practical Medicine, &c.* By James Copland, M. D. Parts I., II. 8vo. London, 1833–4.

The first and second parts of the Dictionary of Practical Medicine exhibit the industry, learning, and general talents of Dr. Copland in a very favourable point of view. In reference to the subjects comprised in these portions of the work, he has evidently consulted with considerable care the writings of the most authoritative physicians, whose opinions and experience are stated with accuracy,

and not unfrequently collated with skill. Whether, however, Dr. C. has always made the best use of the materials thus collected, and arranged them in the manner best adapted for easy reference, and for conveying to his readers an accurate view of the present state of medical knowledge in reference to the several topics discussed, are questions which will admit of very considerable dispute.

We confess that we commenced our examination of the work with expectations which have not by any means been realized. The praises bestowed upon it by some of the English journals immediately after the appearance of the first part, and the fact of its being recommended in the strongest terms by one or two of our leading physicians as a practical treatise, well adapted for the use of American physicians, led us to believe that we should find it to be throughout an able digest of the present state of medical science. In this however we have been disappointed. The dictionary of Dr. Copland is, strictly speaking, a treatise on the causes, symptoms, and treatment of the more prominent diseases of the human organism, arranged in alphabetical order. Consequently the various subjects embraced under the heads of anatomy, physiology, materia medica, pharmacy, obstetrics, and operative surgery are excluded.

The leading doctrines of the day in relation to the correct etiology and pathology of disease, are but slightly touched upon, while the author's own views in connexion with these important points, are in many instances extremely vague and unsatisfactory—being rather crude hypotheses than legitimate deductions from well-established facts.

The correctness of this assertion might be established by numerous quotations from that portion of the work which lies before us; the following however from the article apoplexy will suffice for the present.

"A careful consideration of the morbid appearances on dissection, (in apoplexy,) in relation to the symptoms, and to analogous changes and their phenomena, have led me to infer that compression of the brain never can take place; that *pressure* exists in the great majority of cases, but even that it is not indispensable to the apoplectic state, and that, although *retarded* circulation, whether caused by pressure, or by any other state, seems very frequently to obtain, it does not constitute the only morbid condition of the brain in apoplexy; or in other words, that apoplexy is not merely a disease of the vessels of the brain, although these vessels are either consecutively or consentaneously affected."

"The circulation of the brain, like that of other important organs, is chiefly under the dominion of that portion of the ganglial system of nerves which is ramified on its blood-vessels, and is distributed otherwise to the organ itself, and an exhausted or morbidly depressed state of the influence those nerves exert on the circulation and manifestations of the brain, with the consequent effect this state has upon the capillaries, particularly in dilating or congesting them, and disposing to their rupture, is the principal cause of, and often constitutes the apoplectic seizure, whether this influence emanate from their chief centres, or from the local sources provided for the peculiar offices of the organ, as the pineal and pituitary glands."

"From this it may be inferred, that the proximate cause of a large proportion of the cases of apoplexy, not omitting even those which are attended with retarded circulation and hæmorrhage, is here imputed primarily to the condition of that part of the ganglial system, which supplies the blood-vessels of the brain and the brain itself. That this actually is the case, is shown (how?) by the nature and mode of operation of the remote causes of the disease; by the fre-

quent affection of the functions of the brain previous to an attack; by the nature of the principal part of the phenomena accompanying the attack; by the disorders observed subsequently, when partial recovery takes place; by the tendency to relapse, and by the morbid appearances which present themselves on the dissection of fatal cases."

"That a congested state of the vessels and retarded circulation of the brain should exist, owing to the diminished or exhausted, or suppressed state of that influence which undoubtedly actuates the vessels, may readily be conceded; but that even in the brain the effusion of a small portion of blood should occasion pressure sufficient to *interrupt* the circulation through it, requires further proof. It seems more probable and consonant with facts observed in other parts of the body, that in cases where the extent of effusion or external injury warrant the admission of pressure, this state gives rise to the apoplectic seizure, as much from the effects it produces upon the ganglial apparatus of the encephalon, as from *interrupted* circulation through its vessels."

"The frequent *inflammatory character* of apoplexy, or the common occurrence of *reäction*, will be readily accounted for, from what has now been stated, for whether the attack commences with dilatation, or increased action of the arterial capillaries, or with exhaustion or deficiency of their vital power, or with retardation of the circulation through the brain and venous capillaries, the result will generally be augmented action of the arteries going to the brain, extending itself in some manner to the heart, and this state will continue until the abolition of the cerebral functions shall have impaired, or otherwise destroyed the heart's action."

"When apoplexy proceeds from causes of an obviously *exciting nature*, or from *sur-action* of the heart and arteries, it seldom occurs until a certain degree of exhaustion of the vital tone of the capillaries has taken place, whereby they become dilated and congested, so as either to press the encephalon against its unyielding case, and owing to the pressure, impede the return of blood by the veins, or to give rise to extravasation, which, when considerable, has a similar effect; injection of the arteries of the brain and its membranes resulting equally from both, owing to the obstructed circulation through the veins."

"There are cases of apoplexy generally presenting the phenomena which have given rise to the appellation of *weak apoplexy*, which, occurring from *depressing causes*, operating upon exhausted states of the encephalon and frame generally, directly suppress or abolish the vital influence of the organic or ganglial nerves of the brain, and consequently the cerebral functions, without producing further change of its vascular system than retarded circulation to so slight a degree as not to amount to great distention and compression, and without occasioning extravasation of blood, although extravasation often does supervene to this state, giving rise to pressure and its consequences, so as to heighten or prolong the primary lesion, and to occasion paralysis."

It is not our intention to enter upon a formal review of the several articles comprised in the first and second parts of Dr. Copland's dictionary; neither do we pretend to deny the correctness of the author's pathological views in relation to apoplexy as set forth in the above quotations; we merely present them to our readers, who, however much they may be pleased with the apparent simplicity of those views, must nevertheless receive them as a mere hypothesis, in the establishment of which, the author has not adduced any striking fact or argument.

The following sentence from the article *debility*, will show the nature of the leading error in the pathological reasoning of Dr. Copland, and one which has, in too many instances, extended its prejudicial influence to his practice.

"Debility is a state of vital manifestation intimately connected with the nature

of disease; and, in whatever acceptation it may be understood, it has been admitted by every physician who has looked beyond the proper and more palpable changes superinduced in the economy, as not only a most important pathological condition, but as often constituting what is, in the common language of medicine, disease itself."

Debility, (diminished vital energy,) produced either directly or indirectly, is made by Dr. Copland to play a most important part in the production of the various groups of morbid phenomena, constituting the diseases of the nosological writers. We need not wonder, therefore, that the author's therapeutical directions should have for their primary and most important object the removal of that debility with which he conceives all diseases, when it does not constitute their very essence, to be so intimately connected. The author is in fact more liberal in the employment of stimulants and tonics than most other English physicians of the present day. Even in apoplexy, while he admits the importance and necessity of venesection and other means of direct depletion when the case is one marked by a flushed face, full and strong pulsation of the carotids, and other striking symptoms of undue determination to the brain, yet in what he denominates *weak apoplexy*, or that very frequent form of the disease, in which the countenance is sunk, the head cool, and the action of the carotids weaker than natural, he forbids the abstraction of blood as well during the premonitory stage of the attack as after the apoplectic seizure has taken place, and directs an immediate resort to restoratives, antispasmodics, tonics, and stimulants. Some of the remedies directed during the apoplectic fit, are camphor, ammonia, ether, and compound tincture of lavender.

Catarrh, according to Dr. C. consists in a *specific* irritation of the mucous surface of the nostrils, extending to the frontal sinuses and eyes, the posterior nares, fauces and throat, and occasionally to the pharynx, œsophagus, glottis and trachea. While the disease is limited to the cephalic mucous surfaces, he directs a judicious exhibition of stimulants. Even after pectoral symptoms have appeared, in some constitutions, he declares, that little or no risk will be incurred of inducing inflammatory action by the same measures.

In diffusive inflammation of the cellular tissue "however great," he observes, "the severity of the pain, or the sensorial excitement; or however frequent, open, sharp, or bounding the pulse; these symptoms should be arguments against, rather than in favour of venesection."

Dr. Copland appears, indeed, to have a most decided aversion to the lancet. It is true, in many instances he directs in general terms the employment of active depletion by the lancet, and under precisely the same circumstances in which it would be resorted to by our own physicians; but when he enters into details, his active depletion will be found to be restricted to the abstraction of a few ounces of blood in the early stage of the case; while even the taking away of this trifling quantity is surrounded by so many minute precautions that we are persuaded whoever should adopt the work before us as his manual, would most assuredly become an irresolute and inefficient practitioner. The necessity for husbanding the patient's strength, and the danger of inducing early and dangerous exhaustion, directly or indirectly inculcated by our author, would unquestionably deter an inexperienced physician from carrying the use of the lancet to that extent which is so essential, in many of the forms of dis-

ease occurring in this country, in order to avoid a protracted illness, or even to rescue the patient from the grave.

As the Dictionary before us has been strongly recommended to the notice of American physicians, we extract the following paragraph in order to show the opinion of the author in regard to the character and professional skill of some portion of the medical public of this country.

"Although opium should be given (in delirium tremens) in full or decided doses, combined as stated above, (in from one to three or four grains—the smaller quantity being repeated twice or thrice, the larger not oftener than once, and after a longer interval,) it should not be persisted in, unless sufficient time be allowed to elapse after each dose; for, as Dr. Pearson has observed, if it does not succeed after its exhibition at first in a decided manner, it increases the intellectual confusion and danger. Some of the American physicians have recommended enormous doses of this medicine. Dr. S. Brown gives from ʒi. to ʒss., or even more, of laudanum for a dose. Dr. S. Jackson prescribes from ten to fifteen or even twenty grains of solid opium every two hours; and states, that four ounces of good laudanum having been given in twelve hours, partly by mistake, a sound sleep of twenty-four hours' duration, and perfect recovery, were the result. I am only surprised that the sleep was not that of death. These are not solitary instances of the extravagance, if not rashness, of some American practitioners; nor, indeed, has the practice of giving excessive doses of laudanum in this affection been limited to them. When we find thirty or forty leeches ordered to be applied to the throat of a child five or six years old in croup, and repeated oftener even than once, and the bleeding promoted, should we wonder that death ensues? Feats of hardihood in medicine are too often the consequence of *clerical* and *practical ignorance;* and they may be allowed to meet their own reward, as long as they are not obtruded into the annals of our science, and thereby set forth to the inexperienced as examples to be followed. But when this distinction is conferred on them, it becomes the duty of those who record the progress of medicine, to note also, and to oppose, its backslidings by the severest reprehensions." C.

XVIII. *Essai sur le Madar, (Calotropis Madarii Indico-orientalis,) contenant l'Histoire Naturelle de cette Plante, ses proprietés Physiques, Chimiques et Médicinales.* Par J. N. Cassanova, C^r^ M. D. &c. &c. Calcutta, 1833. pp. 69. 8vo.

The Madar, or Mudar, as it is termed by Ainslie and Wallich, has long enjoyed the highest reputation in India as a remedy in leprous and cutaneous affections. It appears that there are a great number of roots known under this name, all however derived from different species or varieties of asclepias; that which is the most esteemed is the *Seifide* or white *Madar.* Almost all writers on the medicinal plants of India have considered this as the root of the *Asclepias gigantea, (Calotropis,* Brown,) but Dr. Cassanova has shown that this idea is erroneous. The proofs he has adduced in support of his assertion, although interesting to the botanist, are of little importance to the physician, as it is evident, from his own admissions, that the medical properties of the *Calotropis gigantea* and the *C. madarii* are identical. It appears that the madar has also been naturalized in the West Indies, where it enjoys full as much reputation for its curative powers as in its native country. The part used in medicine is the cortical

portion of the root deprived of its epidermis. This is of a whitish colour, with little or no smell, and of a bitter and slightly nauseous taste. From an analysis of it by our author, it appears that it contains—1. An extractive substance, (*Madarine,*) soluble in alcohol and water, and which is probably its active principle, 5.00. 2. A resin remarkable for its property of not liquifying at the temperature of boiling water, and by its slight solubility in alcohol, 4.00. 3. A gum probably containing some madarine, 8.00. 4. A large quantity of starch. 5. Albumine. 6. A little fixed oil. 7. Ligneous fibre.

The medicinal properties of the madar are undoubtedly of a high order, and we have the concurrent testimony of a number of eminent practitioners in support of its efficacy in the obstinate cutaneous affections of tropical climates. Mr. Robinson* speaks of it in the most exalted terms in elephantiasis and venereal affections; and Mr. Playfair† states that he has found it of the greatest service in lepra, hectic fever, &c. in doses of grs. iij. to xii. three times a day, gradually increasing the quantity. Ainslie, however, thinks that the dried milky juice is possessed of more decided powers.

Dr. Cassanova has given it a more extended trial than any of the above-mentioned practitioners, and has been fully satisfied of its importance as a therapeutic agent. He states, that its action is more particularly directed to the skin, increasing the action of the capillaries and absorbents of that tissue. When combined with opium it acts as a diaphoretic, and in small doses is expectorant and tonic. In large doses it causes nausea and vomiting. He has been very successful in the cure of chronic ulcers by the use of this remedy, in small doses, three grains twice a day.

It is evident, from all that we can gather on the subject of the madar, that it is a valuable addition to the materia medica, though not likely to come into use in this country, as we have an excellent substitute for it in the roots of several closely allied species of plants, viz. the *Asclepias syriaca*, and the *Apocymum androsæmifolium*, and *A. cannabinum*, all of which possess analogous properties; the latter especially deserves the attention of practitioners in the same class of diseases in which the madar has been so successfully employed. The experiments of Dr. Mears and Griscom with this plant show, that in chemical composition and remedial powers it is almost identical with the *Calotropis*.

R. E. G.

* Medico-Chirurgical Transactions, Vol. X. † Ibid. Edinburgh, p. 414.

QUARTERLY PERISCOPE.

FOREIGN INTELLIGENCE.

ANATOMY.

1. *Malformation—Absence of Anus—Recto-Vaginal Canal.* By M. Ricord.—I was consulted a few days since, by a girl, twenty-two years of age, who requested to be examined, saying that her lover accused her of having communicated to him a blennorrhagia, which was utterly impossible, as she never had connexion with any other person; she also asserted that she was not made like other women, and begged me in consequence to pay a little more attention than common to her case. Having been frequently consulted by many females on pretended deformities, which consist in nothing more than a slight prolongation perhaps of one nympha, or of the carunculæ myrtiformes, I am not in the habit of attaching much importance to their stories on this subject. The external genital organs did not present any thing remarkable or morbid, and the speculum was immediately introduced with facility. The parts which embraced its extremity were perfectly healthy, and did not offer any thing abnormal or morbid to the eye. However, the depth to which the instrument was carried without meeting the neck of the uterus began to excite some astonishment, when a lump of fecal matter was brought into view, simulating to the touch the os uteri, and also some grape seeds, which were at first taken for vegetations. Being now convinced that some malformation existed, as the girl had at first mentioned, M. Ricord examined the organs of generation with the greatest care, and found the parts in the following state: the labia majora and minora, the clitoris and its prepuce were of the regular size, and well formed; the meatus urinarius was placed in its accustomed situation, and did not offer any thing particular; the posterior commissure of the vulva and the fourchette were also in the normal state; but on examining the perineum, we could discover no trace of anus; the place which the orifice should naturally occupy was marked by a brown spot, irregularly radiated, about the size of a shilling, and without any hair, although the mons veneris and vulva were overshadowed with a great abundance of this material. The ring of the vulva, which did not present any carunculæ myrtiformes, was furnished with eccentric folds formed by the mucous membrane, and engaged a certain power of contraction much less than that of the sphincter ani, but much more powerful than that of the common constrictors of the lower part of the vagina. Beyond this vulvar ring the finger penetrated without causing any uneasiness into a kind of canal, which from its situation and functions deserved the name of recto-vaginal. The speculum, which did not produce the least pain when introduced, exposed to the view a mucous membrane, deprived of those transverse ridges so commonly found in the vagina; and when pushed on to its full length without meeting the least

prominence or line of demarcation, it was arrested by fecal matter. When a finger was placed in this canal, while a female sound was introduced through the urethra into the bladder, nothing was felt between them except a septum, which might be compared to the utero-vaginal, or recto-vaginal wall. The toucher, exercised in every possible direction, and the speculum introduced to the greatest depth the instrument would permit, did not discover the least trace of a uterus. Upon questioning the woman with respect to the processes of defecation, menstruation, and sexual intercourse, M. Ricord discovered the following particulars; the fecal matter was always passed by the vulva, and was perfectly under the command of volition, but gaseous fluids often escape involuntarily: when the fecal matter presented itself at the orifice of the vulvar ring, she felt a desire to go to stool, and when this desire was satisfied, the finger introduced as deeply as possible, no longer met with any obstacle; the female besides has always taken care to use an injection immediately after, and to wash herself well, by which precaution she always kept herself clean. Menstruation has never made its appearance under any form, and no trace of blood has ever been discovered by her in the urine or feces. Although she has lived for three years with the same man, the latter has never appeared to have suspected or known the existence of any malformation; the first sexual intercourse which she had was not accompanied with any pain, for there never was any hymen to break, and the construction of the vulvar ring was feeble in this young woman. She feels the desire of sexual intercourse; however, she says, that according to the account she received from her female friends, her own desires are less strong, and her enjoyment not so great as in others of her sex. Finally, this girl is tall, slender, well made, her form and physiognomy are those of the female; the bosom is well developed, and has never experienced since the age of puberty any sudden change of volume, her voice is soft and sweet like that of a female. Before we terminate this observation, the practical and moral consequences of which may be readily deduced, we may notice that in three days this young female, who was not ill at the time of her first visit, returned with a urethral blennorrhagia, without any affection of the vulva or recto-vaginal canal.

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2. *On some points of the Anatomy of the Eye.*—Some anatomists have denied the existence of the *conjunctiva* upon the cornea; Henle has settled this question; he has injected the vessels of the conjunctiva, and observed them to pass beyond the border of the cornea. That part of the conjunctiva which is attached to the cornea is considered as a serous membrane by Arnold, and that which covers the sclerotica, according to the same writer, constitutes the transition of the mucous to the serous tissues.

The *sclerotica* and *cornea* are continued one into the other, at least in part, according to Frænzel and Arnold. The latter has not found nerves in the cornea; but Schelmm has seen them in the eyes of oxen, and in the eyes of a stag; these nerves arise from the superficial ciliary nerves and dip into the border of the cornea but cannot be traced further.

Arnold and Frænzel both agree in considering the *choroid* as a simple membrane, and in maintaining that its division into two layers is artificial.

Arnold asserts that the *iris* is a simple membrane, which does not possess muscular fibres, but is composed solely of nerves and blood-vessels.

Much difference of opinion has existed respecting the termination of the *retina.* Frænzel admits with Zinn that this membrane terminates at the origin of the ciliary processes by an even and well-defined border. Henle has seen this termination at half a line from the zone of Zinn; whilst Arnold maintains that the retina lines the ciliary processes, and terminates like them at the border of the crystalline capsule. Finally, Huschke asserts that the retina covers the ciliary processes, and terminates with the choroid at the origin of the iris. The central foramen of the retina has been but rarely seen by these different ana-

tomists; but the fold of the retina has always been observed, and considered by Huschke and Stark as the cicatrix of the fissure, which, in the fœtus, traverses all the coats of the eye, but persists longest in the retina. Stark attributes the yellow spot to a pigment secreted by a vessel of the choroid which penetrates the retina in this spot to proceed to the vitreous humour.

The *ciliary ligament* is composed, according to Eble, of a gelatinous substance contained in a cellular tissue, of vessels, and finally, of nerves, which form in this ciliary ligament a true plexus, which probably sends filaments to the ciliary processes. Ammon and Arnold maintain, on the contrary, that this ligament is principally formed by cellular tissue, and has not the least analogy with a ganglion or plexus.

Some anatomists assert that the *membrane of Demours*, or of the *aqueous humour*, after lining the anterior chamber is reflected upon the anterior face of the iris. Arnold is not of this opinion; he believes that this membrane forms a closed sac as long as the pupillary membrane exists, and that consequently it does not cover the urea. Henle combats these two opinions; he contends that the membrane of the aqueous lines the posterior surface of the cornea, passes beyond the junction of this last with the sclerotica, and extends some distance between this latter membrane and the ciliary ligament, without being reflected upon the iris.

The *crystalline capsule* is composed, according to Arnold, of two membranes, of which the exterior is cellular, and abundantly supplied with blood-vessels, whilst the interior which is serous, has none, but possesses lymphatic vessels. The blood-vessels of the posterior parietes of the capsule come from the central artery of the retina; the anterior parietes receives its own from the vitreous humour and ciliary processes. Henle, however, has only once found the vessels in the anterior parietes of the crystalline capsule injected; this was in the fœtus of a sheep; these vessels arose from the posterior parietes of the capsule. An anonymous writer, (*Ammon's Zeitschrift*, B. II. p. 430,) announces a singular fact, which appears to merit investigation; this author asserts that he has seen in the fœtuses of sheep and sows, branches of the *central artery of the retina* ramify in the posterior parietes of the crystalline capsule, afterwards in the anterior parietes of this capsule, and finally, anastomose with the *venous* branches of the pupillary membrane at the margin of the pupil.

According to Arnold the *crystalline lens* is composed of capsules, the parietes of which are formed by lymphatic vessels. Huschke, on the contrary, who has made numerous microscopic researches into the texture of the crystalline, maintains that it is fibrous. It results from these researches that in the fœtus and in the infant, the crystalline is divided into three segments by three fissures; in each of these segments the fibres form a curl, (*tourbillon*, Wirbel;) as the individual becomes older the curls subdivide, and new fissures form, which are all directed from the centre towards the circumference; in adults from 10 to 13 are found. The number of fibres of the superficial capsule of the crystalline is from 3120 to 4000 in a man of fifty years.

The *zone of Zinn* is, according to Arnold and Huschke, only a continuation of the hyaloid membrane; Henle, on the contrary, maintains that the zone of Zinn cannot be a continuation of either the membrane of Jacob, or of the retina, since this zone has vessels which come from the choroid. That the two first of the membranes mentioned have no vessels at all, and that the retina does not furnish its own to the zone of Zinn; this last assertion is however contested by the anonymous author above quoted.

Between the different principal coats of the eye modern anatomists have found membranous lamina, respecting the extent and nature of which anatomists have not agreed. They are generally considered as serous. Huschke admits the existence of a *serous membrane* between the sclerotica and choroid, and believes that it is continuous with the membrane of the aqueous humour; another serous or *membrane of Jacob*, between the choroid and retina; and a third, *vascular lamina*

of the retina, between the retina and hyaloid. Arnold and Frænzel have also seen the serous membrane which separates the sclerotica from the choroid; the first terms it the *arachnoid of the eye*; the latter thinks with Huschke that it is continuous with the membrane which lines the posterior face of the cornea. The membrane of Jacob, according to Arnold, is only a mucilaginous layer which forms after death. Henle doubts likewise the serous nature of this membrane, which he has never been able to trace as far as the ciliary body, and in which he cannot discover any vessels. Frænzel and Ammon, on the contrary, assert, that the membrane of Jacob lines the choroid and ciliary processes, and is attached to the capsule of the crystalline. This termination is formed, according to Ammon, by filaments which extend from the ciliary processes to the exterior face of the crystalline capsule, and constitute what this physician has called the *capsulo-ciliary circle*. The *pupillary membrane* has been particularly examined by Henle. This author has seen that membrane arise, as was first stated by Rudolphi, from the exterior portion of the iris, and not from the margin of the pupil; in large eyes the distance from this border to the point where the membrane arises was a quarter of a line. Contrary to the opinion of J. Cloquet, Henle has never observed the pupillary membrane tense; but always convex either anteriorly or posteriorly. He further states that the French anatomist and Blumenbach were wrong in denying the existence of the internal arterial circle of the iris in the fœtus. He has also seen some very delicate blood-vessels in the centre of the pupillary membrane, of which, according to Cloquet, it is completely deprived. Henle has injected the vessels of the pupillary by the internal jugular vein, and has also succeeded by the arteries; but he has never succeeded in injecting the veins after the arteries were injected; the injection was always effused between the retina and choroid.

This same anatomist believes that he has discovered, with professor Müller, of Bonn, a new membrane, which he names *capsulo-pupillary*, and which arises from the same place as the pupillary membrane upon the exterior face of the iris, folds over the border of the pupil, and proceeds to attach itself to the crystalline capsule where the zone of Zinn terminates. Henle states that he has observed this membrane in the fœtus of all animals, (sheep, calf, deer, cats,) which he has dissected, but that he has not found it in the human fœtuses, those which he examined having remained too long in alcohol.

The capsulo-pupillary membrane receives its vessels from the central artery of the retina, and transmits them to the pupillary membrane, which appears to be only a continuation of the first membrane. Arnold and the anonymous writer already quoted, deny the existence of this false membrane; they attribute the error of Henle to the method he pursued for the discovery of the capsulo-pupillary membrane, a method which consists in opening the posterior chamber of the sclerotica, and inverting the iris with the pupillary membrane. By this process a part of the crystalline membrane or of its exterior lamina alone remains attached to the pupillary membrane, to which the crystalline capsule is always more or less adherent. The capsulo-pupillary membrane cannot then, according to these authors, be any thing but a lamina of the crystalline capsule.—*Archiv. Gén. June*, 1833.

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3. *Anomaly in the Venous System.*—A curious instance of this has been communicated to the Anatomical Society of Paris, by M. Peyrot. A free communication existed between the two sides of the median line, between the crural and iliac veins on the one part, and the umbilical vein, unobliterated, and the vena porta on the other. This communication was established by means of the abdominal tegumentary veins, which were so enormously enlarged as to cover in the shape of two vast pyramidal tumours the anterior parietes of the abdomen. This communication between the iliac vein and the vena porta formerly noticed by Lieutaud, and more recently by MM. Manec and Ménière, constitutes a normal state in several reptiles.—*Rev. Méd. Feb. and May*, 1833.

PHYSIOLOGY.

4. *Tubercles Developed in the Origins of the Third, Fifth, Seventh, and Eighth Nerves—loss of Hearing, Sight, and Smell—Preservation of the Sense of Taste, and of the Sensibility of the Integuments of the Face.* By M. Nelaton.—Feret, a girl, twenty-one years of age, was admitted into the Hôtel-Dieu on the 10th of March, the immoveable expression of her countenance, her projecting and fixed eyes; and her slow manner of speaking, seemed to indicate the presence of idiotcy in this female. She complained of constant pain in the head; six years ago she commenced to experience these pains, and since that period the sense of hearing has gradually failed, and within three months she has lost the power of smell. The sensibility of the skin remained unaffected, both on the face and rest of the body. Voluntary motion was freely exercised on both sides with vigour; the sense of hearing was nearly lost; the voice, which had become feeble when she first entered the hospital, was soon lost altogether; when the point of a stilet was moved along the surface of the ocular conjunctiva, it did not excite the least mark of sensibility, although the membrane was dry, and evidently much inflamed. The whole surface of the nasal fossæ might also be touched with a stilet introduced into the nostril, without the patient being conscious of it; ammoniacal paste, when placed under the nostril, seemed at first to produce no effect, but in a few moments excited efforts to cough. The peculiar sense of the tongue was however unimpaired, for the patient recognised salt when placed in the mouth; the general sensibility of the tongue was also unaffected, and the gums were in a healthy condition. The patient died suddenly on the 3d of May. On the examination of the body, the middle portion of the brain and the medulla oblongata were found much developed; the olfactory and optic nerves did not present any morbid appearance during their whole course; the fourth pair of nerves, the external ocular motor of the left side; the glosso-pharyngeal and hypoglossal nerves seemed also free from any lesion; but all the other nerves of the brain were increased to at least three times their natural volume; small spheroidal tumours, of two or three lines in diameter, were developed in the interior of the nervous chords, or attached to their sides. Some of these tumours were perfectly well defined, though without cysts, and others were irregular in their forms. They were all formed by a yellow opaque matter, similar to that which is found in the centre of tubercles imperfectly softened, and the nerve itself suddenly contracted in size, after having traversed this tubercular mass. The two common motor nerves of the eye were implanted on the summit of a cone formed by this substance, which was also found in the fifth nerve on both sides, but at variable distances from their point of origin; a small tubercle, half a line in diameter, was attached to the origin of the external motor nerve of the right side, but the greater part of the nervous filaments passed above it, and were not altered. The seventh nerve was diseased from its origin to the bottom of the meatus auditorius internus; the pneumogastric nerve was also diseased in the same manner, for the extent of an inch below its exit from the foramen lacerum posterius; the optic and olfactory nerves did not present any morbid change of structure in their whole extent.—*Lancet.*

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5. *Functions of the Lingual Nerves.*—MM. Choisy and Montault, have communicated to the Anatomical Society of Paris, a case which throws considerable light upon the functions of the different nerves of the tongue. A man, thirty-three years of age, had paralysis with atrophy of the left side of the tongue; the sense of taste remained unaffected on both sides. The patient died with symptoms of compression of the superior portion of the spinal marrow. On post mortem examination, the muscles of the tongue on the left side only were found atrophied, and the corresponding hypoglossal nerve. The atrophy of the nerve extended to the place of its exit from the cranium, where it was compressed by hydatids. Some hydatids were also found around the

superior portion of the spinal marrow, the functions of which they impeded. The lingual nerve was normal; the left glosso-pharyngeal appeared to have been compressed—the patient towards the close of life had had paralysis of the organs of deglutition.—*Rev. Méd. February and March*, 1833.

6. *Instance of Superfœtation.*—A married woman, aged twenty-two, was delivered January 25th, 1832, in the Lying-in Hospital, at Berlin, of twins. The children were both girls, and died in two hours after birth; their birth took place before the end of the seventh month from the date of pregnancy. One child was white, the other evidently a half caste, as was indicated by the shape of its head, and by the colour of its face, hands and feet, which resembled that of persons who have been tinged by taking nitrate of silver in large doses. The same difference of colour was strikingly evident in the umbilical cords of the infants! but not in the membranes of the placenta. On inquiry it appeared that she was in habits of intimacy with a negro, shortly after or at the time she had conceived by her husband.—*Dublin Journal, Hecker's Annales.*

7. *Life and Respiration continued After the total Destruction of the Brain.*—A deformed woman was delivered with the crotchet in 1828. In 1830, she again became pregnant, and it was resolved after fruitless trials with the forceps to effect delivery by destroying the child's head. Doctor Beyer performed this operation, took away both parietal bones, entirely emptied the cranium of brain, and then extracted the infant, which was wrapped in a towel, and laid near the stove. Dr. B. being engaged in endeavouring to extract the after birth, heard a sort of wimpering issue from the place where the child lay. In about three minutes the child uttered a distinct cry, when Dr. B. opened the cloth, and was astonished beyond measure at finding the brainless infant breathing, and moving both hands and feet; an occasional cry, and the other signs of life continued for several minutes, when the infant at last died.—*Ibid.*

PATHOLOGY.

8. *Case of Anœmia of the Kidney.* By James Wynn, Esq.—The following case of anœmia of the kidney lately came under my observation, and was remarkable from the circumstance of its not having presented any symptoms, which could have led to a suspicion of the organic changes which must have been going on for a considerable time previous to death.

January 13th. J. B., aged 50, a weaver. There is extensive œdema of the trunk, face, and limbs, and particularly of the scrotum, which measures sixteen inches in circumference. States that he had been labouring under more or less œdema of the legs for three years, but that it was only within the last three months that the swelling of the belly and scrotum appeared. The principal symptoms which attracted attention were the universal anasarca above mentioned, increased action of the heart, accompanied with bellows murmur, and very loud bronchial respiration in the upper and anterior portion of the left lung. These symptoms continued with very little alteration, excepting some diminution of the swelling of the scrotum from the use of elaterium, for about a week, when attention was directed to the state of the urethra, on account of his complaining of making water very frequently in small quantities, and attended with difficulty and pain in passing it. Upon attempting to introduce a catheter, a stricture was discovered near the bulb of the urethra. By the use of the catheter, leeching, &c. he was enabled to make water a little freer, and with less pain, but this amelioration was of short duration. Vomiting, of a grayish fluid, came on a few days afterwards, accompanied with extreme debility, and which symptoms continued with little intermission until his death, which took place shortly afterwards.

Necrotomic examination—Chest.—Left ventricle of the heart considerably hypertrophied without dilatation, and a similar state of the right, but not to so great an extent. Lungs gorged with serum, and the upper portion of the left lung considerably advanced in the first stage of hepatization. *Abdomen*—Peritoneum contained about six ounces of fluid. Liver, stomach, spleen, and intestines, apparently quite healthy. Both kidneys were of an unusually pale colour, and upon making incisions through them, their cortical portions were found to have degenerated into a fibro-cartilaginous substance of a pale-yellow colour; the tubular portions were quite sound, excepting one or two points where a few of the uriniferous tubes appeared to have taken on the same diseased action. Mucous membranes of the calyces and pelvis were of a natural consistence, and no where injected. Bladder very much contracted, and contained a small quantity of turbid urine; sub-mucous cellular tissue indurated and thickened to the extent of a quarter of an inch; mucous membrane very much injected, but of the natural consistence. Prostate gland—texture *quite* natural, size *normal*—a firm old stricture was discovered in the membranous portion of the urethra, and the remains of a false passage.—Head not examined.

Remarks.—This case, as thousands of others have done, proves the fallability of general signs, and the superiority of physical, as shown by the appearances found in the chest, and those in the abdomen. The former were indicated before death, but the affection of the kidneys presented no signs, by which any notion could have been formed respecting the nature of the lesions discovered on inspection. It is satisfactory, however, to learn, that even if the precise nature of the disease could have been discovered, medicine would have been of little avail, at least when the structure of the kidneys had become so extensively diseased as it must have been at the time he applied for medical assistance; although, it is probable, the disease might have been arrested, could it have been discovered and properly treated at the outset. The original cause of this affection I consider to have been the habitual dysuria produced by the stricture, and which ultimately led to atrophy of the kidneys from the mechanical impediment it must necessarily have caused to the functions of those organs. That the lesions were owing to anœmia and not irritation, I think probable, from the circumstance of the mucous membrane and tubular portion of the kidneys being quite healthy, whilst the *secerning* portions were perfectly bloodless.—*Glasgow Med. Journ. April*, 1833.

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9. *Case of Hypertrophy of the Muscular Coat of the Stomach.*—Dr. Otto, of Annaberg in Saxony, relates in *Hufeland's Journal*, for Feburary, 1833, an interesting case of hypertrophy of the muscular coat of the stomach, a pathological condition of rare occurrence. Morgagni, Haller, Baillie, do not mention it. Meckel in his Pathological Anatomy, only observes in a general manner, that the parietes, especially the muscular coat of the stomach of great eaters, are thick. Beclard in his additions to Bichat's General Anatomy, does not notice this kind of hypertrophy, and speaks only of that of the heart and bladder. Louis has noticed this subject more particularly than any other French writer, in his Anatomico-pathological Researches. When treating of cancer of the pylorus, he quotes two cases of hypertrophy of the muscular coat of the stomach, which he compares to the parietes of the ventricles of the heart, the fasciculi were prominent; in both cases there was scirrhus of the pylorus, and M. Louis proposed the question, whether the contraction of the duodenal orifice of the stomach was the cause of the hypertrophy. In the following case there was neither scirrhus nor contraction of the pylorus, and the opinion of M. Louis that these two diseases are independent on account of the frequency of the one and the rarity of the other, is confirmed.

A woman, forty-nine years of age, thin, sanguineous temperament, mother of several children, had experienced many domestic troubles, from which she endeavoured to distract her mind, by indulging her appetite for eating, which became incredibly voracious. In the summer of 1827, she complained of pe-

riodical dyspnœa, and swelling of the right foot; her menses ceased; she became emaciated; her appearance was that of a person in bad health. Nevertheless, she had no tumefaction of the abdomen, nor pain there on pressure; her appetite was good; evacuations regular; tongue clean, and she never complained of nausea, borborygmy, hiccup, or laborious digestion. The respiration was easy, pulsation of the heart feeble, the pulse normal. She was remarkably depressed in spirits. The predominant symptom consisted in a periodical dyspnœa, which recurred every evening, sometimes even during the night, and produced a sensation of weight in the lower part of the abdomen, which rose up like a ball towards the heart, and impeded her breathing. These symptoms continued for six or eight minutes, and always a long time subsequent to a meal. Their intensity became so great, that the patient was at times delirious; she even at one time attempted to hang herself. At the commencement of winter the emaciation made alarming progress, without the appetite being diminished, or the digestion deranged, and although the patient was so enfeebled, that she could not quit her bed. The violence of the paroxysms constantly increased; the marasmus took place, with subsultus tendinum, weakness of the organs of sense, coma, loss of sensibility, delirium, and finally, death on the 19th of December, 1827.

Autopsy, ten hours after death.—The pectoral organs were healthy; the heart small; the pericardium contained a little serosity; omentum wanting; liver and spleen normal; stomach shrivelled and thickened, especially towards the pyloric region, and along the larger curvature, which appeared less extended than the smaller; its blood-vessels empty; its mucous membrane thin, almost translucent, ordinary consistence, covered with a viscid and thick mucus, elevated by numerous muscular fasciculi, the size of a goose-quill, the direction of which was from the great cul-de-sac to the pylorus. These gave to the internal face of the stomach the appearance of that of the heart. Beneath these fasciculi the muscular coat formed a layer of half an inch in thickness. The remainder of the intestinal canal was in a normal state, as were also the urinary passages. This case is interesting in a double point of view; 1, in a pathological aspect, connecting the stomach with other muscular sacs; 2, by the almost total absence of symptoms referrible to the digestive organs.—*Rev. Méd. Aug.* 1833.

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10. *Observations on Epidemic Gastric Fever, as it appeared in Limerick Garrison during the months of May, June, and July,* 1833. By Richard Poole, Esq. Assistant-Surgeon 32d Regiment.—Affections of the alimentary canal were the prevailing disorders in the 32d Reserve, during the period of its being quartered in Limerick; but it was not until the subsidence of the influenza, that any examples of gastric fever made their appearance. Before this, one or two sporadic cases of an inflammatory type had occurred; but in these no decided evidence of gastro-enteric character existed. Besides, as the treatment, apparently the best adapted for these, would have had less beneficial effects in the complication mentioned, it is but fair to infer, that the alimentary canal was not the seat of any lesion that could have influenced their character; and it is singular, too, that, even during the time cholera existed in the garrison, some fevers, without any gastric complication, made their appearance.

Be it remarked, then, it was not until the influenza had existed for some time, and was on the decline, that a change in the type of the fever was observable; and that it is from this period I date the commencement of the epidemic which it will be my task in the following pages to describe.

It is not necessary for me to mention here the frequent instances on record of gastro-enteric fever, and diseases following the march of this singular affection. They are well known to most of the older practitioners who have paid any attention to epidemic constitution, and are amply detailed in the article Influenza published in the Cyclopædia of Medicine, to which I refer. It is equally unnecessary for me to give the *rationale* of their connexion. This must strike any one who considers the similarity of the textures concerned, especially

as, of late, attention has been much paid to the sympathies existing between the two membranes, and to the facility with which disease in the one is extended to the other. The article on Epidemic Gastric Fever by Dr. Cheyne, in the work alluded to, is a valuable summary of most of the facts connected with the disease; and nothing would induce me to go over nearly the same ground, but the wish to adduce further testimony to the truths it contains,—and some anxiety to impress upon the attention of my professional brethren in this country, the necessity of admitting the existence of a class of diseases which requires a plan of treatment very different from any promulgated by the authorities on whom they have been long in the habit of placing exclusive reliance.

That the disease in question depends upon a lesion of the gastro-enteric mucous surface, I conceive to be as probable as the connexion between *pneumonia* and its symptomatic fever; and, although I cannot bring forward necroscopic appearances to elucidate the position,—none of the cases having proved fatal,—I consider the relative proofs so strong, that I do not hesitate in giving to the disease the name here fixed,—believing that, under this, it is deserving of a place in any system of nosology founded on a pathological basis. Its similarity to the disease described by Dr. Cheyne, who gives several dissections, is further evidence of the correctness of this view.

Most of the cases which came under my observation presented, before the disease was unequivocally developed, considerable general disturbance, but by no means of a nature to excite apprehension of its invariable results,—being confined in a great measure to lassitude and prostration,—the patients complaining of general uneasiness, without being able to point out one sensation more uncomfortable than another. They were heavy, dull, and listless,—hanging over the fire,—feeling chilliness at one time, and irregular distribution of heat afterwards, with loathing of food, and frequent inclination for cold drinks, from the dry and parched state of the mouth. This was generally greatest in the morning. The complexion was usually dusky, all trace of sanguification being gone from the cheeks, and often from the lips. These disagreeable symptoms lasted for several days, and were soon followed by the development of fever, which was most complete towards night. The pulse averaged at 110; was sometimes tense, but generally soft and full. The skin became remarkably dry and harsh; moisture was never observed on it; and, in some cases, it assumed a degree of roughness similar to what is observed in chronic affections of the gastro-enteric organs. The patients became more and more depressed, and were overpowered by an apathy to external objects or ordinary impressions; and, though even now they scarcely complained, except, perhaps, of weakness, the whole expression showed amply the extent to which the disease had overcome their energies. As the fever may be now reckoned at its height, it will be better, for the purpose of elucidating its nature, to take a view *seriatim* of the symptoms, as referable to their respective localities.

I think it will be proved, in the course of this memoir, that the symptoms which might be termed cerebral were merely functional or sympathetic; but, to make the history as complete as possible, I shall mention, in the first place, all of them that may be attributed to an irritation of the *sensorium*. The most remarkable of these was profound torpor. The patient lay without exhibiting any evidence of intellect remaining,—the eyes were closed, and only sluggishly opened when he was addressed,—a few incoherent words were uttered at first, and as it were at random,—but presently he became roused, and answered questions as distinctly as the dry state of the mouth would permit. There was now complete return of consciousness, and the patient described with correctness his situation and feelings. In one case only, a man of the 83d Regiment, was there total insensibility, with picking the bed-clothes. Some complained of confusion in the head, giddiness when it was raised from the pillow, with noise and buzzing in the ears. Deafness was also observed. In one, twitching of the lips and slight contortion of the mouth were detected; but these, I think,

were almost entirely occasioned by the intense dryness of the fauces. Pain in the head was seldom complained of, and certainly was not felt at all by many, while giddiness and beating were often mentioned. The eyes was never injected, but dull and heavy; the cheeks seldom flushed,—the complexion being generally of an earthy-yellow cast.

All these symptoms, I am induced to believe, were entirely due to sympathetic excitement, and in no case appeared to depend on structural lesion. They become worthy of some special consideration, with a view to tracing their dependence on derangement existing in another situation. To this, however, I shall refer in its proper place.

The chest, examined by the stethoscope, afforded in every case, during the pyrectic stage, numerous sibilant and sonorous rattles; but I generally found these disappear, without being followed by others, or any symptoms of bronchial disease. In some cases, however, they were attended by cough and expectoration, but never with pain; and in several I found benefit result from treating this affection locally,—a fact which I might readily have overlooked, but for the stethoscopic observation.

From these circumstances, and many others which I need not detail here, I think the stethoscopic signs deserving of attention, in showing the intensity of the disease when taken along with the symptoms; but I safely can state, that I usually considered the former of little importance, when not accompanied by other evidence of disease, and that I never had cause to regret having done so. Laennec probably carried his views on this point too far, and I hold the profession indebted to Dr. Graves for having sometime ago drawn their attention to the subject, and shown the errors into which we may fall by placing too much reliance on the signs furnished by auscultation during the progress of certain fevers.

But to proceed. The pectoral symptoms, when they did appear, were never serious. Some cough, with varied expectoration, might occur in the morning; but there never was any thing like profuse secretion from the bronchial membrane, and in none of the cases did the *parenchyma* or its investments suffer.

A *gastro-enteritis* being, so far as I can determine, the immediate cause of the phenomena observable in this disease, the symptoms ascribable to the disordered *viscera* demand the greatest attention. Yet with all this, an observer might overlook the seat of the whole mischief, and be led to consider a disease essentially specific, and requiring a distinct plan of treatment, as either of no importance, or similar to others which he is daily in the habit of meeting. A most mischievous and absurd blunder about pain at *epigastrium*, red tongue, &c. as characterizing gastric complication in different diseases, has been of late freely promulgated; and one is almost tempted to understand, that inflammatory affections of the muco-enteric surface have been specially favoured in being made so palpable to our powers of discrimination. But, however *decided* ignorance may be in its dogmas, any one who has paid attention to the diseases in question cannot but state, that their symptoms are far from being so glaring, and, from out of the innumerable variety exhibited, will fail in pointing out any one or two as pathognomonic. In none of the numerous disorders produced by this lesion are the symptoms so varied and obscure as in the one before us; and it is only from their assemblage, and not from any one in particular, that a diagnosis can be made. For example, in not one of the cases did there exist tenderness at the *epigastrium*, or any other part of the abdomen. Pain and weight, indeed, were often felt, but they were by no means constant, and depended most frequently either on distention from wind, or the soreness that attends a loose state of bowels.

Diarrhœa invariably ushered in the complaint, and frequently reäppeared during its course; but the bowels were at other times slow, and required to be unloaded. Every medicine in this way, however, required to be of the mildest nature, as even the gentlest laxative produced often violent effects. The fecal discharges were varied;—in some they appeared wholly serous or mucous; in

others natural, but liquid. Various intermixtures of colouring matter were frequent;—in some blood; in others bile; and, in a case in the 83d Regiment, what might be termed mælena. In this case, large quantities of calomel and Cayenne pepper had been given by a practitioner in the country, who, fortunately for the patient, considered his case bad enough to have him removed to head-quarters. Griping was a frequent attendant, but *tenesmus* was not observed. Vomiting of *bilious*-looking matter occurred in one case; but the stomach was generally retentive, though nausea was by no means unfrequent. Complete *anorexia* existed for many days. The patient obstinately refused to eat any thing,—appearing to loathe the sight of food, or the idea of using it.

Thirst was incessant, cold drinks being greedily asked for, and relished; whereas any thing warm was as much an object of aversion as food. The mouth for many days was dried up, and parched to a remarkable degree; the fauces, gums, and tongue were red and glazed, as if covered with gold-beater's skin; the latter, during the course of the fever, became hard, dry and chopped, enveloped with a firm dark brown or black fur, and bleeding from its numerous fissures, when protruded from the mouth, which was done often, only with difficulty. This state of the tongue was very constant, and lasted until the fever was on the decline. The dryness of the fauces, as I mentioned before, was the cause of the deficient power of enunciating which existed in all the cases. I was led at first, however, to look upon it in another and more serious light.

To the state of the stomach and bowels must also be referred the constant prostration and feeling of languor and helplessness which characterized the attack; and I cannot but believe, that the torpor observed in many was but a high degree of this feature. The value of determining the point can only be appreciated by taking into consideration the readiness with which it may be confounded with *coma*, and attributed to structural derangement of the brain, or its membranes. In two of the cases in which it was most evident, a man of my own corps, and one of the 83d Regiment, in which it was attended with involuntary discharge of fæces, total insensibility, picking the bed-clothes, and other ataxic symptoms, it was entirely removed by copious leeching of the abdomen, and cold drinks,—with small doses of *Acet. Morph.* in the latter case; in which, had it been occasioned by sensorial lesion, it would surely have been increased by the opiate. In the former case, the assumed debility and prostration were so intense, that the patient could scarcely turn in bed. Yet, after the second or third leeching, he recovered so much, that, on awaking from sleep, and probably dreaming of other days, he got out of bed, put on his clothes, walked down stairs, and was found at the door of the hospital by the hospital-sergeant, whom he told he was going by my leave to visit his mother in an adjoining county.

These facts, with others which I need not detail here, serve to show that prostration and torpor are but shades of the same disorder; and that, whenever they exist, we are warranted in believing the gastro-enteric surface the seat of more or less inflammatory action. They are, however, by no means new, having been brought before the profession some time ago by M. Broussais, since confirmed by the researches of Andral, and, if less known in this country than they deserve, which I think scarcely admits of a question, it is the fault of a few to whom for a long time a blind deference has been paid by the mass of practitioners. This, however, is not the place for a discussion of the subject.

The duration of the stage, characterized by the preceding symptoms, varied, of course, in different cases, but on an average, may be stated to have lasted from a week to ten days. In all of them was observed great tendency to muttering during sleep; and several of the patients got up while asleep, and attempted to leave their wards. The pulse varied but little, either in frequency or force,—being often for days 130, but seldom under 100. In this fever, no critical discharges were ever observed; the symptoms gradually declined in se-

verity; the skin became softer and cooler during the day, but evening accessions were observed for some time afterwards; the tongue got daily more moist,—the dry patches disappearing, and being replaced by a creamy deposit, which I always looked upon as the harbinger of recovery. In some cases, this became dry and scaly, from some fresh irritation; but in some of them it slowly went off, leaving the tongue remarkably white, and as it were firmer and closer, from being decreased in volume. The thirst abating, some appetite was felt; but it was never craving or vocarious, and was readily satisfied by light farinaceous diet, which the patient invariably relished more than any other that was offered. The cough generally went off about the same time; the bowels became easy and regular, and seldom required during recovery, assistance from medicine. Convalescence was tedious and protracted, but in no case was there any relapse.

The duration of the attack averaged from five weeks to two months. As I stated before, no death occurred in any of the cases that came under my observation, which included a squadron of dragoons, the 32d Reserve, and 83d Regiment; but I was given to understand that the son of an officer belonging to another corps sank under a protracted attack. Some cases of fever of a like character prevailed in town; but I cannot state any thing concerning their progress or termination.

Treatment.—General bleeding was adopted in several cases at the commencement, with a view to cut short the disease by making an impression on the system, and to pave the way for local depletion; but I cannot state that in any it appeared to fulfil the intention. In no case, however, did it seem to do harm, as the quantity abstracted was never great. My conviction is, it might have been safely dispensed with in all, as the *phlegmasiæ* of mucous membranes, and especially of the enteric, appear to be little under the influence of the general circulation, and few of them ever excite any violent action of the heart, which demands the use of this remedy. But for all this, cases often occur in which the general excitation is great, and in these, general depletion is undoubtedly required, as the attempt to unload the capillaries must be always futile when the centre of circulation continues over-active. I might digress here to some length, as the subject is an interesting one; but the object of this memoir being merely to describe facts and occurrences, any thing like discussion is contra-indicated.

Suffice it to say then, that none of the cases exhibited any great vascular excitement, and that the general bleeding was perhaps used more from speculation than cogent reason. Local depletion was in all of my own cases freely used when the disease was pronounced, and different parts of the abdomen were at times selected for this purpose. When much diarrhœa existed, the position of the lower end of the *ileum* and course of the colon was chosen,—the region of the *duodenum* in one, in which there was much yellowness of the skin and *conjunctivæ;* and in most of them, at one time or another, the *epigastrium*, without being demanded by any of what have been looked upon as specific gastric symptoms. Leeches were always used, as cupping is generally more irksome to the patient, and frequently a less efficacious means of procuring blood. From this remedy the best effects were produced,—in most of the cases a marked improvement following each application. The extent to which it was carried was regulated of course by the demand. In some cases, as of men belonging to other corps, in whom the treatment had been conducted from the beginning on different principles, and who presented the worst symptoms observed in the disease, copious leeching was invariably followed by an almost immediate change for the better, and it was from this period alone that the recovery might be dated. I can therefore safely state, that, on this remedy, I chiefly depended as a means of reducing the local affection, after which the progress of recovery was uninterrupted.

Different counter-irritants were likewise applied to the abdomen, as emetic

tartar ointment, any of the ethers, turpentine, &c. the former frequently with good effects in restraining diarrhœa, and the others in relieving the sensations of uneasiness complained of.

Counter-irritation on the chest was freely used during the existence of the pectoral symptoms. Tepid and even cold sponging was plentifully used, and always produced grateful and salutary effects. The loose state of the bowels at the commencement precluded every thing in the form of purgative; but during the course of the disease, attention was paid to procuring daily evacuations by laxatives or *enemata*. This affection, as Dr. Cheyne truly observes, is not a fever that requires any thing like a purgative plan of treatment,—all that is demanded being merely the emptying the contents of the canal, which is to be done only by the mildest remedies.

As adjuncts to local bleeding, in allaying the irritation of the membrane, and quieting the different uneasy sensations that occurred, I found many of the sedative medicines beneficial, and when used with caution and due regard to the condition of the patient, I can safely say, that even under circumstances which might be accounted as contraïndicating their employment, they always appeared to me to be followed by excellent effects. The medicines of this class chiefly used were hyoscyamus, or the acetate of morphia. The former, in almost every stage of the disease, produced quietness and relief to the local pain; it in some instances gently moved the bowels, and frequently in full doses produced a quiet night's rest, without being followed by disagreeable sensations next morning. Combined with any of the gum solutions, but especially the tragacanth, it formed an excellent lenitus for allaying the cough, and even in this form, appeared often to relieve the irritation attending the diarrhœa. The morphia was used in several severe cases in the 83d Regiment, even under the worst of the *cerebral* symptoms, with good effects, and in no instance appeared to increase them. I used it in several cases in the 32d Regiment, and found that it frequently procured good nights without any bad effects; but in others, observing the tongue in the morning more parched, I was naturally led to substitute for it the hyoscyamus, which never occasioned any change in the secretions. In advanced cases, it answered better, particularly if there was troublesome diarrhœa.

During the whole course of the fever, the patients drank freely of cold acidulated mucilages, which relieved their thirst in a way most grateful to their feelings. During the first week or fortnight, abstinence was both enjoined and voluntary; but, on the return of the appetite, mild farinaceous diet was allowed, and the patients by degrees, as the fever declined, returned to the use of more nourishing food. In some, a little wine or malt liquor was allowed during convalescence; but they were not generally required.

I may conclude by saying, that the treatment adopted, with the exception of the depletory measures, was essentially expectant;—in fact, there were but few symptoms to combat, and I took care, as far as possible, to develope no new ones,—a care, in which, as there never appeared any of those alarming and sudden phenomena so peculiarly observed under different circumstances, I have some cause to believe I succeeded.—*Edin. Med. and Surg. Journ. January*, 1834.

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11. *Paraplegia Dependent on Chronic Inflammation of the Spinal Cord.*—Dr. Craigie has recorded the following interesting case of this affection in our esteemed cotemporary, the *Edinburgh Medical and Surgical Journal*, for January last. This case occurred in an unmarried female, thirty-five years of age, who had been in hospital about twelve months previously, with symptoms of *hemiplegia*, which had partially disappeared after treatment of some weeks' duration, but left a degree of inability to walk, in consequence of an involuntary spasmodic contraction of the flexor muscles of the thigh. Some months after she complained of a sense of weakness, and constriction referred to the lumbar region; and about a month before admission, (*i. e.* about the 25th February,

1833,) she began to complain of inability to move the left lower extremity without dragging it, and a sense of numbness from the lumbar region downwards, and also in the left iliac region. At the period of admission on the 25th March, she complained much of the involuntary spasmodic traction of the flexor muscles, which, with a sense of painful distention round the belly, was so considerable, as to disturb her nights and prevent sleep. The appetite was stated to be good, the general health not affected. The pulse, however, was from 80 to 90, the skin hot and dry, and the tongue covered with a brown dry fur. The intellectual functions were unimpaired, and the urine and feces passed naturally. The whole vertebral column bore pressure and warmth without uneasiness; and there was no deformity or change in direction.

As I was convinced, from the symptoms now enumerated, that the spinal chord or envelopes were the seat of a chronic inflammatory process, I ordered blood to be drawn from along the course of the dorsal and dorso-lumbar region of the spine by leeches and cupping, the bowels to be emptied by the compound colocynth pill and calomel, and occasionally by croton oil, aloes, and calomel.

An attack of shivering, with sickness and vomiting, succeeded by heat, quick pulse, general pains, and an aggravation of the spasmodic attacks, made me dread the accession of an acute form of the complaint, and induced me to order a general blood-letting to the amount of eighteen ounces, to be followed by a dose of infusion of senna and the saline mixture; and, as the blood was much buffed and cupped, and she bore the evacuation well, twelve ounces more were drawn in the evening; the bowels were freely opened by cathartic medicine, and blood was drawn from the ileo-lumbar region, to which much pain was referred, by means of leeches. Under the use of these agents she was less distressed with the spasmodic contractions, and she thought that she had more command of the lower extremities. Rose, which, however, all this season was prevalent in the hospital, appeared on the back and belly, and added much to her sufferings. On the 6th, she complained much of tension and constriction of the belly, the stools were passed unconsciously, and the bladder had lost its contractile power, requiring the urine, amounting occasionally to six pounds, to be withdrawn by the catheter.

These symptoms continued to the 10th, when they were aggravated by the addition of sickness and vomiting. The muscles of the lower extremity, as well as the *rectum* and bladder, did not recover any power; and, after a state of listlessness and extreme feebleness, with respiration only at eleven in the minute, yet without hiccup or insensibility, death took place on the 14th.

On laying open the spinal *theca*, there was found effused beneath it a considerable quantity of fluid highly tinged with blood, probably chiefly from divided vessels. Along the whole course of the dorsal *vertebra* the *theca* was injected and thickened, especially anteriorly. On dividing the *pia mater*, part of the spinal cord, opposite the tenth, eleventh, and twelfth dorsal *vertebræ* protruded like a *hernia cerebri*, and it was found to be extremely soft, pulpy, and of a homogeneous cream colour. This condition of the cord extended upwards to the second dorsal *vertebra*, and downwards to the second lumbar *vertebra*, diminishing in both directions gradually till it terminated in sound cerebral matter. It was most remarkable in the posterior surface, where all trace of organization was destroyed, but less so at the anterior surface, excepting at the spot opposite to the tenth and eleventh dorsal *vertebræ*, where, when removed from the sheath, it was so unable to sustain its own weight that it fell asunder.

On examining the brain, a considerable quantity of fluid was found effused under the arachnoid membrane, rendering it opaque. The substance of the brain was healthy. The ventricles were slightly distended by serous fluid; and the choroid *plexus* and the *pia mater*, at its junction with that web, were remarkably vascular.

In the chest the right lung was generally adherent. Both were emphyse-

matous in some degree anteriorly and inferiorly, and the superior lobes were highly œdematous, emitting frothy serous fluid in considerable quantity on each incision. The heart was natural in size and structure.

The liver was rather paler and firmer than natural. The other organs were sound. In this case the pulpy destruction of the spinal cord, which gave rise to the paraplegic symptoms, arose spontaneously, so far as could be discovered, or, at least, was unconnected with any disease of the *vertebræ*. The *theca* alone appeared to be in a state of previous chronic inflammation; but this could not have been adequate alone to induce the disease of the spinal cord. The arteries also were sound.

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12. *Case of Myelitic Paraplegia depending upon Disease of the Bodies of the Vertebræ.*—This case is also recorded by Dr. CRAIGIE in the same journal. The subject of it was a widow, Isabella Meldrum, aged fifty-three, following the occupation of a washerwoman. About five or six months before, she had fallen down a flight of stairs, and lighted on her back. This accident attracted little attention at the time. But about the close of January, 1833, she was affected by tingling sensations, with numbness in the limbs, while her general health was enfeebled by dyspeptic symptoms. The tingling sensations continuing, she was attacked, in the course of two weeks more, by severe pains in the epigastric and right lumbar region, with great general feebleness and partial loss of motion and sensation of the lower extremities, beginning first in the feet and toes, and extending upwards. When these symptoms had continued about two weeks, the feet became œdematous and cold; and constipation was followed by involuntary discharge of the feces, while the bladder becoming over-distended, lost its retentive powers. The constant trickling of urine in this manner had produced large sloughs over the *sacrum*, while the application of excessive warmth to the insensible skin of the feet had been followed by several bad sores. In this state she was admitted on the 24th March, with the *abdomen* much distended and tympanitic, sensation almost gone below the epigastric region, the feet and legs œdematous, the temperature rather above natural, the hypogastric region painful, and the urine incessantly trickling from the bladder.

By the frequent use of the catheter, the bladder recovered much of its power, and she was made comparatively comfortable. The bowels were opened by calomel and colocynth, with the aid of occasional enemata; blood was drawn from the region of the spine by means of leeches; powders consisting of supertartrate and nitrate of potass, and carbonate of soda, with aromatic powder, were given to act on the kidneys; a light but nutritious form of diet was directed; and to the sloughs on the back and sores on the feet poultices and the warm dressing, or the resinous ointment, were applied.

Under these measures, I. Meldrum became greatly more comfortable, and recovered some sense and motion of the limbs; the urine became copious; the œdematous swelling of the feet subsided; and the tympanitic sensation of the *abdomen* abated. It was very soon observed, however, by the constant weight and pain in the hypogastric region, with the turbid, clouded, fetid urine, that she was labouring under catarrhal inflammation of the bladder. The thirst continued unquenchable, the tongue dry and brown, the pulse never below 112, and the skin hot and dry; and after lanquishing for two weeks more, notwithstanding the use of appropriate remedies, with such articles of nourishment and wine as she could take, she died on the 25th April.

The following appearances were observed.

At least one ounce of serous fluid was found within the *theca* of the spinal cord. When this was laid completely open, the cord was found pale, and of a dead white colour, and as soft as thick cream, first at a part corresponding to the eleventh and twelfth dorsal *vertebræ*, where it broke down completely, and was void of organization. Upwards from this the cord was softened as far as the seventh cervical, and downwards as far as the second lumbar *vertebra;* and through the whole of this extent it was of the consistence of thick cream of a

dead white colour, and without marks of fibrous structure. The eleventh and twelfth dorsal *vertebræ* were on their posterior surface denuded of *periosteum*, and presented a quantity of granular matter, on removing which the *cancelli* were exposed and somewhat softened and carious. The intervertebral cartilage, between the first and second lumbar *vertebræ*, presented a globular excrescence about half an inch in diameter, and one-fourth in elevation. There was another smaller one between the second and third lumbar *vertebræ*. On opening the *thorax*, five of the dorsal *vertebræ* were found covered on the right side by an oblong cyst containing pulpy matter of an atheromatous appearance and consistence. On removing this cyst, the bodies of the *vertebræ* were found deprived of *periosteum*, and their cancellated texture exposed.

The convolutions of the brain were much softened, and a considerable quantity of serous effusion was found in the sub-arachnoid tissue. The substance of the brain was softened, and the ventricles contained some serous fluid.

The upper extremity of the left kidney was closely adherent to the diaphragm and spleen; at the inferior part was an abscess containing tubercular granular matter, which was found on dissection to communicate with the *pelvis*. Several of the *calyces* were enlarged, and contained similar matter. The *ureter* was dilated and thickened, and its mucous membrane inflamed and roughened on the surface.

In the right kidney the *pelvis* was also dilated, and its mucous membrane thick and roughened. The *ureter* was also enlarged and thickened.

The coats of the bladder were much thickened, its mucous membrane of a bluish colour, irregular, and covered with bloody patches. The dimensions of the bladder were much contracted.

This and the preceding case illustrate remarkably a general fact observed in the approach of palsy, especially when it depends on a progressively advancing disease of the central parts of the nervous system. In both, the accession of the symptoms was marked by painful involuntary spasmodic contractions of the flexor muscles. This indicated, not that the nerves of the flexor muscles were most affected, but that those of the extensors were already diseased so far as to have lost all controul over the muscles. In consequence of this, with the disturbed action at the central ends of the nerves generally, the inherent irritability of the flexor muscles gives rise to spasmodic contractions. This phenomenon is not observed when the injury or disease is so great as to extinguish suddenly all sensation and motion, but only when it advances so slowly and progressively as to pass through successive stages to the final result.

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13. *Case of Periostitis with Ozæna.* By DAVID CRAIGIE, M. D.—This case occurred in the person of a woman named Robina Wright, aged twenty-nine, who had been long known as one who, though not exactly a public female, had been subjected to repeated courses of mercury. At a former period, syphilis had produced destruction of the *recto-vaginal septum;* and she subsequently suffered much from the contraction consequent on cicatrization. At present, (19th February,) she applied for admission for symptoms of rheumatism; but the pains mistaken for this disease were evidently the *dolores osteocopi*, or the deep-seated aching pain resulting from inflammation of the *periosteum* of the *tibia* and of both *parietal* bones.

The usual remedies of local depletion and counter-irritation were applied. Opiates were exhibited, and the warm bath was administered; and, had it not been for the epidemic prevalence of *erysipelas* at this time, with the dilapidated state of the patient's constitution, this woman's sufferings might have been alleviated, and the disease retarded in progress.

An obstinate fetid puriform discharge, however, from the nostrils, with some tenderness in the situation of the nose, indicated the existence of inflammation of the *periosteum* of the bones of the face; and the occurrence of *erysipelas*, by aggravating her febrile symptoms, disturbing her sleep, and affecting the brain, very soon brought her to a state in which medical treatment was of little or no

avail. After a combination of low delirium with stupor for four or five days, succeeding on the intense swelling of the face, with symptoms of extreme difficulty of respiration, tracheo-bronchial rattling, and incapacity to swallow, she died on the 9th of March, suffocated apparently by the constant accumulation of mucus from the back part of the nostrils upon the *glottis* and *larynx*.

Upon inspecting the body, a great quantity of viscid purulent mucus was found covering the posterior nasal cavities, the posterior *fauces*, *the glottis*, *epiglottis*, and *pharynx*. The *periosteum* of the nasal bones, of the upper part of the superior maxillary bones, where they form the floor of the orbit, and that of the superior and inferior spongy bones was completely detached, and came away as if it had been subjected to long maceration or boiling. The *periosteum* of all these bones was very much thickened and extremely vascular; and between it and its respective bones, purulent or sero-purulent fluid was interposed. The bones themselves, instead of presenting the usual bluish colour, were more or less white; and the upper part of the orbitar plate of the left maxillary bone, as well as the inside of both nasal bones, was of a dead white.

The membrane lining the *antra* of both maxillary bones was in like manner very much thickened, and covered with a viscid purulent secretion; and when this was removed, it was found to be granular, villous, and much injected. This membrane also adhered very loosely; and when an incision was made into it, it was found to be detached from the body plate of the *antrum*.

These appearances showed clearly that the inflammation of the *periosteum* had destroyed the connexion between the vessels of that membrane and the surface of the bones, and had thereby first interrupted the nutrition of these bones, and then produced their death, or *necrosis*. There is no doubt, that, eventually having now become foreign bodies, they must have been discharged in this manner from their situation; and there is also equally little doubt that, until this result was consummated, they must have maintained an inflammatory action and suppuration, or a series of actions, interrupted only or alleviated in their severity by the occasional escape of portions of bone of various sizes.

Permission to inspect the head was, from particular circumstances, not obtained. I had an opportunity, however, of inspecting the outer surface of each parietal bone near the tuberosities, to which chiefly the gnawing pains of the head were referred; and there, also, I found the connexion between the *pericranium* and parietal bones completely destroyed on the right side, and very much loosened on the left. The *pericranium* itself was thickened, and contained some serous infiltration. But the parietal bones presented no new deposition or irregularity of their surface. It was, however, though not so white as the bones of the nose and face, less blue than natural, and not completely dead. The anterior surfaces of both *tibiæ* were extremely rough and irregular, with deep longitudinal lines, presenting the worm-eaten appearance described by the older authors. These longitudinal depressions appeared to be formed in the substance of a new osseous deposit. The *periosteum* of these bones was thickened and indurated; but at the period at which I inspected it, it was impossible to say whether it had been preternaturally vascular or not.

This case I regard as particularly valuable for several reasons. It shows, in the *first* place, the true cause of *ozæna*, and the manner in which syphilitic or mercurial caries of the bones of the nose commences. That disease does not originate in the bones, but always begins in the fibro-mucous tissue which covers these bones, and by the vessels of which they are in a great measure nourished. I do not pretend to say whether this morbid action originates from the poison of *syphilis*, or the noxious operation of mercurial medicines; but one thing I know to be certain, from a considerable number of cases that have fallen under my observation, that the frequency of this disease of the *periosteum* is in the direct ratio of the quantity of mercury that has been taken, and the number of times that mercurial courses have been exhibited. The subject of the present case had been repeatedly under the influence of mercurial medicines; and though, like others, she had always derived from them immediate improvement,

this was destined to be followed by an invariable aggravation of the periosteal disease.

Omitting, however, these considerations with regard to the cause, this case demonstrates unequivocally the nature of the action. It shows that the first step of the process is inflammation of the fibro-mucous membrane covering the facial bones; and that this inflammation commences most readily in those in which these two membranes are in immediate contact,—for instance, the inner surface of the nasal bones; the superior and inferior spongy bones; and the naso-palatine plate of the superior maxillary bone. The next step is the effect of this inflammation. The overloaded vessels are unable to transmit blood as formerly, into the substance of the bone; they become detached, while they give rise to a new morbid secretion; the bone, in the meantime deprived of its ordinary nutriment, either becomes carious, or is killed outright, and is necessarily, after exciting much irritation, expelled as a foreign body.

This representation I have derived, not from the case of this woman alone, but from several similar ones in which I have had occasion to observe the same train of phenomena.

In the *second* place, it is worthy of observation, that periosteal inflammation produces two different effects,—one a detachment of *periosteum*, with death of the bone; the other a deposition of new bone, rendering the surface rough and irregular. The former action appears to be much more violent than the latter; and while the case of this patient presented both varieties of the action, the former in the parietal and facial bones, and the latter in both *tibiæ*, it was the former chiefly that produced with the *erysipelas* the fatal termination of the disease.—*Ed. Med. and Surg. Journ. January*, 1834.

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14. *Meningeal Apoplexy.*—M. Alégre has communicated to the Anatomical Society of Paris an example of this in a female, seventy-one years of age, who died suddenly. A clot of the size of an almond was found beneath the cerebral protuberance, between the nervous substance and the pia mater, and communicating by traces of coagulated blood to numerous small surrounding coagulæ, also situated beneath the pia mater. The most minute researches in the cerebral substance could not detect any lesions from which this blood could have come. This form of apoplexy so frequent according to M. Cruveilhier in new-born children, is rare in adults.—*Rev. Méd. February and July*, 1833.

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15. *Apoplexy of the Spinal Marrow.*—M. Monod has communicated an instance of this rare affection, to the Anatomical Society of Paris. In this case there was found near the origin of the inferior dorsal nerves, a sanguineous effusion in the central gray substance, to the extent of two inches and a half. This effusion had commenced on the right side, and extended to the left. The blood had diffused itself from its source along the central gray substance of the right side, as far as the second dorsal pair of nerves. The symptoms were remarkable; the first consisted in pain at the seat of the effusion; which pain extended corresponding to the effusion along the spinal column; it also extended to the loins, along the nerves which arise from the seat of the apoplexy. The second symptom was paralysis of motion in the corresponding limb; but a singular phenomenon, and which the cadaveric lesion did not explain, is the loss of sensibility of the left side. The symptoms came on gradually, and not suddenly as in cerebral apoplexies.—*Rev. Méd. February*, 1833.

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16. *Case of Melæna with the Dissection.* By David Craigie, M. D. &c.—This case occurred in the person of George Craig, a man, thirty-five years of age, sanguine and plethoric in appearance. This man, who had been at one time a soldier, but now pursued the occupation of a tailor, had been for many years past addicted to incurable and uninterrupted habits of dram-drinking; and all the money which he was enabled to procure was spent in indulging this craving for liquor. For two weeks previous to his application at the hospital,

he had complained of a painful sense of weight and distention all over the *abdomen*, but referred more particularly to the umbilical region, and the upper margin of the hypogastric. This was accompanied with sensations of dullness, head-ache, impaired appetite, occasional squeamishness, much thirst, and general feebleness. The head-ache subsided on the 2d or 3d day; and the only symptom which continued obstinately was the faint squeamishness and the painful sense of tension and weight, which was at admission referred to the epigastric, umbilical, and upper part of the hypogastric regions, with the occasional sickness, but without vomiting, tenderness, or tension. The tongue was white and moist; the bowels were reported regular; the pulse was natural, from 70 to 80; and the skin of moderate warmth.

Two colocynth pills and three ounces of infusion of senna had the effect of moving the bowels freely but gently, cleansing the tongue, and abating the abdominal pain very much; and on the 14th he had no complaint except squeamishness. As the pulse and cutaneous heat were natural, all medicine was omitted; and he was left to the effect of the fever diet and time.

He continued easy and without complaint, except a little sickness, till about eight in the evening, when he began to feel a sense of weight in the belly, which continued till half-past ten. At this time an urgent call to stool was followed by a copious gush of pure blood from the *rectum*, which was repeated at different times in the course of one hour and a half, till it amounted to five or six pounds. At 12, an opiate enema was administered; and after this no more blood was discharged; but he continued in a very faint and languid state for about three hours, and expired at three on the morning of the 15th.

The blood discharged from the intestines when examined next day consisted of dark-coloured fluid blood mixed with large clotted masses.

On laying opent he cavity of the *abdomen*, the peritoneal surface of the intestines was deeply stained of a dark pink-red colour, in some points lighter, in others more intense, but particularly so long the whole course of the *ileum*.

In the cavity of the stomach there were found two pounds of blood, chiefly dark-coloured, partly clotted and grumous, partly semifluid. When this was removed the mucous membrane was observed to be deeply tinged with red blood, and the membrane was itself thickened and injected, but not softened. The mucous membrane of the *œsophagus* was perfectly pale and blanched. On holding up the mucous membrane to the light, the large vessels were seen much loaded, and the substance of the membrane itself deeply tinged, and the small vessels distributed through it. Upon the most careful examination of the membrane, no blood was found issuing from any particular aperture.

The mucous coat of the *duodenum* was in like manner coloured deep red, and the glands were somewhat more distinct than natural. The whole mucous membrane of the *jejunum* and *ileum* was in like manner deeply tinged with red blood. Fully three pounds of blood, partly fluid, were found chiefly towards the lower part of the *ileum;* and when this was removed, and the mucous membrane carefully washed, it still presented a very deep coloration, its vessels much injected, and the *villi* much erected and covered with a thin pasty layer, which was also tinged red. On the most careful examination of the whole membrane, no aperture could be discovered, but merely a general oozing from the membrane. Previous to removing this substance, the superior mesenteric artery was exposed, and a quantity of water forcibly injected, but without detecting any open or ruptured aperture, the water escaping only from the surface of the membrane by numerous minute vessels. The intestinal glands, both solitary and agminated, were perfectly healthy. A small quantity of clotted blood was found in different parts of the colon, but its mucous membrane was healthy.

The liver was perfectly healthy.

The spleen was very much softened, and of a deep colour, like masses of coagulated blood.

Head.—The membranes and surface of the brain were more injected than

natural, and its substance presented numerous dark red streaks. The ventricles were also dilated, and contained a small quantity of serum. A good deal of serous fluid was found in the subarachnoid tissue at the base of the brain.

The lungs were perfectly sound.

The heart was free from disease, and its valves perfectly healthy. But the beginning of the *aorta*, between the semilunar valves and the arch, was much elevated and irregular, from steatomatous matter deposited in tubercular masses, and especially around the origin of the large vessels; and a large crimson-red patch was found on the arch under the *tunica intima*.

The right kidney was deeply injected, but healthy; the left presenting some disease of the granular matter.

These appearances show clearly that the intestinal hæmorrhage which had proved the cause of the death of this man did not proceed from any single vessel, or two or three vessels, which had been eroded, perforated, or ruptured, as might have been imagined, but that it issued from the vessels of the entire mucous surface of the *duodenum*, *ileum*, and perhaps also from those of the stomach, previously thrown into an injected and congested condition, and then undergoing disorganization at their extremities, as in *melæna*, yellow fever, and similar states of the gastro-enteritic membrane. I afterwards learned from a respectable man, who was in the habit of employing Craig, that he was a habitual dram-drinker,—that all the money which he earned was spent in the purchase of spirits,—and that, after he had received a few shillings for his work, he was in the habit of spending it all by sixpences in drinking, so that he was often days without food, or taking any thing but the deleterious liquor to which he was so much attached; and that, previous to the illness which proved fatal, he had spent several days in this pernicious course.—*Edin. Med. and Surg. Journ. Jan.* 1834.

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17. *On the Pendulous Tumour of the External Ear.* By Dr. A. Campbell.—At the meeting on the 2d March, 1833, a letter from Dr. Campbell was read, containing an account of the pendulous tumour of the external ear, which is a very frequent disease among the natives of the valley of Nipal; and often observed to occur in the same individuals who are affected with goitre. Two tumours were sent by Dr. Campbell to the Society's Museum; they had grown from the helices of the ears of a woman, and drew down and doubled the ear over the external meatus auditorius, so as greatly to obstruct hearing. The surfaces of the tumours were uneven, and their feel fleshy, but firm; their internal structure is described as resembling that of mammary sarcoma. They were removed by simple incision with a scalpel, and weighed together twenty-four ounces. The wounds soon healed, and the ears resumed their natural position. The patient from whom these tumours were taken, is affected with a large bronchocele; her eldest daughter, aged nine years, has a tumour the size of a walnut, attached to each external ear, and another daughter, aged six years, has a goitre of three years growth, which is as large as an orange. In the same communication the author states, that bronchocele very often occurs in animals in Nipal, lambs and kids being often born with remarkable morbid development of the thyroid gland; some preparations of these diseases were also sent, as well as a steatomatous tumour, the size of a small orange, which was removed from the sheath of the penis of a dog; this animal was taken to Nipal from the plains of Bengal in March, 1832, and in July the disease was observed and removed.—*Trans. of Med. and Phys. Soc. of Calcutta, Vol. VI.*, 1833.

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18. *Swelled Leg resembling Phlegmasia Dolens, and Obliteration of the Iliac Vein.* By J. C. Boswell, Esq.—On the 8th February, 1832, an emaciated Chinese pauper was brought before the Police at Penang, and from the circumstance of his not speaking, he was supposed to be insane; however, on examination, it appeared that the man was unable to speak in consequence of the extremely low and miserable state to which he was reduced. Besides the great

general debility, there was an uniform swelling of the left lower extremity, extending from the toes to the groin. The limb was nearly three times the size of the other; it was cool, œdematous, and it pitted on pressure, but was rather elastic, and of much lighter colour than the opposite limb; the glands in the groin were not swollen. As only one limb was affected, the disease was not considered common œdema. The patient died on the third day after he was first brought under observation. On post mortem inspection, the cellular structure of the limb was found loaded with serum. The femoral vein was turgid with coagulated blood; the middle portion of the iliac vein appeared constricted, as if compressed by a ligature, and there were several enlarged and indurated absorbent glands near that part, from whence upwards the cavity of the vein was filled with laminæ of firm coagula, the extremity of which extended across the lower part of the vena cava, above an inch into the right iliac vein, but there was no sign of disease in the vessels of the right side. The mesenteric as well as the bronchial glands were much enlarged and indurated; and there were extensive marks of chronic disease in the lungs.—*Ibid.*

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19. *Case of Engorgement of the Occipital and Vertebral Ligaments—Palsy and Atrophy of the left half of the Tongue.*—A man, aged 30, whose employment it is important to notice, as it materially influenced the development of his disorder, was received in this hospital in the course of last year. He was a lace-weaver, and was accordingly obliged to work in cellars and on cold and damp ground floors. Persons of this trade are very subject to rheumatic affections, and swellings of the ligaments of the joints. Three years ago, this man was seized with a very sharp pain of the left and back part of the head, which totally impeded him from moving the parts, and deprived him of sleep. In the course of five or six days they changed their position, and settled in the left side of the upper part of the neck. The pains were not now so violent, but motion of the head was still impossible. Lateral flexion of the head, it is true, was partly performed by the totality of the cervical column; and the head could, moreover, be slightly bent forward and backward by the same means. The seat of the malady was evidently in the vertebræ themselves, if it was not in the muscles—a supposition which, as we shall see, was inadmissible.

The next peculiarity observable in this case was, a difficulty of speaking; at first inconsiderable, but increasing gradually to such an extent, that, at the end of two months, the patient could not be understood. He said that the air passed by the left side of his tongue with a whistling sound, and when he wanted to say *je*, he could only utter *ze*. There were some pains at the angle of the jaw and in the cheek of the left side; but there was no paralysis of the muscle in that quarter.

Another symptom now became remarkable. The tongue began to diminish in bulk on the left side, and the diminution soon amounted to a perfect atrophy. The organ at this part appeared to be formed of nothing more than membranous folds, which could be rubbed together without feeling in any degree muscular: it felt like an empty leather purse. When the tongue was put out, its right side seemed sound enough; and the atrophy of the left, which was most visible at the end and middle portion, was inconsiderable at the base. The right side even seemed to enjoy a more than usual degree of strength and activity, as is observable in other parts of the body when the corresponding parts are paralyzed. There was a curvature to the right side when the tongue was thrust out. It was only in the first months that articulation was difficult or impossible: when examined at the hospital, he could speak as well as if there had been no atrophy. This must have been the result of practice; for it is known that speech can be effected by this means with half a tongue, nay with a less portion, a third, a fourth part, and even with a stump that is scarcely visible.

I was anxious to find what changes had occurred in the sense of taste; and with this view I made four watery solutions of sugar, sulphate of quinine, com-

mon salt, and an acid. I tried them first on the healthy subject: some of the pupils submitted to the experiment. Keeping the tongue motionless, a few drops of these solutions were applied to the tip—there was no taste perceived; they were applied then successively to the middle and to the base, when the different flavours were perfectly distinguished. Trying the same experiments on the patient, it was found that there was no sense of taste at the tip of the atrophied side; but in the middle portion, and according as the base was approached, the more acute and perfect was the sense. Thus it appeared, that though the muscles were gone, the sense of taste remained in all its perfection—a remark of very great importance.

By considering next, what nerves are distributed to these muscles, we were still further able to form an opinion of the seat of the disorder, and the cause of the atrophy. The nerves of the tongue are the lingual, the glosso-pharyngeal, and the hypoglossal; the lingual being distributed to the nervous papillæ of the surface; the glosso-pharyngeal to the back part and lateral portions of the pharynx: the first is subservient to the taste, the second to the motions of the organ. Now the sense of taste being unimpaired, the lingual nerve was safe; and if there had been an alteration in the glosso-pharyngeal nerve, the functions of the pharynx would have been impaired, and the base of the tongue would have suffered more or less from the atrophy. The nerve of the ninth pair, the great hypoglossal, then remains; and it is worth while considering the origin and distribution of this important agent. It arises from filaments in the furrow situated between the corpora olivaria and pyramidalia, on the sides of the medulla oblongata, and issues from the skull by the anterior condyloid foramen, at the internal and posterior side of the foramen lacerum. The eighth pair, in like manner, passes through at the same place; but it does not appear to have been involved in this malady, for the functions of the stomach and alimentary canal remained unimpaired. The nerve of the ninth pair receives and gives off numerous branches: some of these are distributed to the muscles inserted in the hyoid bone; others supply the middle cervical plexus; and accordingly, in the present case, the left side of the neck seems to have been not so well supplied as the right. This nerve, in fine, which is the true mover of the tongue, is terminated every where in muscular parts. So much then being premised relative to the different functions of the nerves of the tongue, we shall now consider briefly whether the atrophy depended on the brain or the nerve.

The acute pains felt by the patient at the commencement of his disorder were simply external or superficial: there was no disturbance of the intellectual functions all along; nor of the locomotive functions: there has been no palsy in parts supplied by cerebral nerves. Nor does the medulla oblongata appear to be the origin of the affection, for there have been no troublesome symptoms in parts supplied from that quarter. Nor, finally, for the same reason, can the spinal marrow be supposed the source of the malady.

Taken in every point of view, the disorder in this case appears to me to result from a lesion of the nerve of the ninth pair, not within the skull, but after its departure from that cavity. This opinion seems borne out by the lesion of the occipito-vertebral articulation. The inability to execute movements of the head seems to point out some affection existing between the vertebræ, the cause of which is probably rheumatism, and the seat the ligaments. The disorder began on the left side: it descended to the neck on the same side; the *point de depart* is then between the occipital and the first vertebra, and perhaps even extending to between the first and second.

Diseases of this kind are by no means rare. There are in the collections of the Ecole and the Museum of Comparative Anatomy, ten or twelve cases of stiffness, with or without luxation, of the first vertebra with the condyles of the occipital. Thus, in the present case, there was inflammatory engorgement, acute or chronic, of the ligaments uniting the vertebræ and the occipital: and as the nerve of the ninth pair passes out by the foramen in front of the occipi-

tal condyle, this nerve must have been either compressed, or altered in its tissue at the point of exit; it must then have become atrophied, and hence the paralysis and atrophy of the left part of the tongue.

The treatment in this case was energetic; for, as the disorder appeared to vanish from the left side, it was found to have some tendency to migrate to the right—the patient beginning to complain of similar, though slighter symptoms on that side. Cupping was freely practised and frequently repeated behind the mastoid processes, and moxas were afterwards employed. The results were satisfactory. I have only to add, that this case of palsy and atrophy of half the tongue appears to me to be a very important one: I have never met with another example of it; and I am not aware that other physicians have given an account of any similar complaint.—*Dupuytren's Clinical Lectures.*

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20. *Remarks on Local Diseases—Pathology of the Diseases of the Digestive System.* By WILLIAM STOKES, M. D. Extracted from a lecture on the Theory and Practice of Medicine, delivered at the Medical School, Park street, Dublin. Session 1833–4.—Gentlemen, I commence with the digestive system. I am anxious to do this for several reasons, but for none more than this—that to the improvements made in the pathology of the digestive system we owe much of the rapid advancement of modern practical medicine. Before our time the pathology of the digestive system was very little known, and if not quite a *terra incognita* in medicine, there existed respecting it a great deal of misconception. The schools were deeply tinctured with the doctrines of the Humoralists and the Brownists; and this had the effect of giving rise to irrational theories and false notions of the true state of the system in disease. The humoral pathologists, who sought for disease in an alteration of the fluids alone, neglected the study of visceral lesions; and when they turned their attention to the digestive system, they only considered it, its secretions, and not its actual condition or the state of its sympathies. The liver, with them, was an organ of the highest importance, and the secretion of bile claimed a vast share of their attention. To it they gave a paramount influence, and to an alteration in its quantity and quality they attributed most of the changes which occur, not only in the digestive tube, but also in the whole system; and hence the great object of their practice was to attempt to restore its healthy condition, convinced that if this were once accomplished, every thing would go on favourably. From this too, arose the purgative plan of treatment in various forms of intestinal disease, a plan too often rashly pursued, even where there was unequivocal proof of inflammation in the digestive tube. Their sole purpose was to evacuate sordes, to produce a flow of healthy bile, and to eliminate depraved secretions; and they did this without possessing any knowledge of local inflammation, or of the effects of disease of the digestive system on other organs. The followers of Brown, on the other hand, only admitted disease of the digestive system in a state of intense, manifest violence, as for instance, ileus, or violent enteritis; but in the great majority of cases, they did not recognise intestinal inflammations, because their prominent symptom was prostration, or to use their own terms, an asthenic condition of the whole system. They saw nothing but prostration; they prescribed for nothing but debility; they gave wine instead of iced water; ordered bark instead of local depletion. They exasperated the disease by stimulants; and then, thinking they had not gone far enough, they heightened the stimulant and doubled the debility.

Another cause of the low state of pathology in former times was the general neglect of dissection. The fact is, that in fever there were no post mortem examinations made, until very lately. Morgagni, who did so much for pathological anatomy on almost every other subject, did little for fever, because he was afraid to dissect the bodies of persons who had died of a contagious disease. This was the idea which prevailed among the older pathologists; and hence this source of knowledge was avoided, and for many successive centuries the state

of the viscera in fever was a matter of speculation, doubt, and uncertainty. Even at the present day it is only done by the ardent pathologist, who cares not about filth and stench, and who had rather encounter the miasm of contagion than remain in the mists of error. Nothing is more common, I regret to say, even at the present time, than this:—A person says he has dissected cases of fever, and when asked whether he had examined the intestinal canal, he says that the intestines appeared healthy, but he did not make any particular inspection of them; he only opened the belly, and, finding no trace of inflammation in the peritoneum, he went no further. Now nothing can be more useless than such an examination. If we compare the information afforded by an inspection of the serous membranes of the three great cavities, we shall find that the least is given by an examination of that of the abdomen. Disease of the substance of the brain is rare without affections of its investing membrane, disease of the substance of the lung is exceedingly rare without the occurrence of disease of the pleura, but you may have most extensive and fatal disease of the intestinal canal without the slightest lesion of the peritoneum. In this point, therefore, it differs from the pleura, and from the arachnoid membrane. The fact of the rarity of disease of the peritoneum in cases of disease affecting the parts beneath, was noticed by Dr. Graves and myself, in our report of the Meath Hospital, and also by Mr. Annesley, in his account of the diseases of India. You will see cases of hepatic abscess, which present a distinct tumour externally, and where you can detect a perceptible fluctuation; and yet, if you examine these cases after death, you may not find any adhesions of the peritoneum, even in the situation of the abscess. You will find the mucous and muscular coats of the colon extensively destroyed, you will see the stomach all but perforated, you will meet with cases where the whole ileum is one extensive sheet of ulcerations, with no disease in the adjacent peritoneum.

In entering on the consideration of diseases of the digestive system, we shall begin first with the mucous expansion of the stomach and intestines, and then proceed to the affections of the solid viscera connected with them. The mucous surface of the stomach and intestines is of enormous extent and extraordinary sensibility, possessed of innumerable and powerful sympathies; its influence is felt by almost every organ in the body, formed for receiving and elaborating every thing destined for nutrition; its conditions, both in health and disease, are entitled to the deepest and most attentive consideration. To facilitate the study of its affections, and for the sake of some practical arrangement, we shall divide its diseases into five classes, beginning with the œsophagus, or that portion of the digestive tube which is above the diaphragm, and then proceeding to the stomach, duodenum, ileum, colon, and rectum. But in order to give you a clear idea of diseases of the intestinal canal, I shall commence with diseases of the stomach; because, if you consider the whole range of animal life, you will find that its functions are the most important, the stomach constituting, as it were, the source and fountain of life, which is nutrition, and giving by its existence a character to all the upper classes of animals. No organ possesses such remarkable sympathies as the stomach, whether we look upon them as sympathies of organic or of animal life, none possesses such remarkable power and influence in modifying the conditions of every part of the system. But, putting aside physiological reasons, let us come to practical matters. The success of almost every form of medical treatment, all the advantages to be derived from the administration of internal medicine depend upon the stomach; in fact, in whatever point of view we consider it, we must look upon a knowledge of the state of the stomach as the great key to sound and successful practice.

It is a most useful reflection to consider the extraordinary frequency of disease in some portion of the digestive tube. It is now admitted by every person possessed of experience in the causes of mortality, that more human beings die with acute or chronic diseases of the digestive tube than with diseases of any other part of the system. This has been established by numerous investigations, and is admitted by the best pathologists; and, indeed, I think it can be

easily accounted for, when we call to mind how many persons die of some form of fever or other, when we look to the ravages of remittent and yellow fever, to the hundreds of thousands who annually perish by the various classes of fevers. Now in almost every one of these cases, disease of the digestive system forms one of the most prominent pathological characters. Recollect, besides, all that die of dysentery, whether sporadic or simple, and here is inflammation of the colon; see too, how may die with diarrhœa,—here too, there is intestinal disease; remember how many die of the malignant intermittent of the West Indies, in which unequivocal proofs of disease of the stomach and intestines have been found. Observe what a close connexion there is between tabes mesenterica, and inflammation of the mucous membrane and surface of the intestines; think what a vast number of persons fall victims to the harassing effects of constipation and dyspepsia; and recollect that there is a host of diseases in which the train of morbid phenomena commences in the digestive system, and then exhibits itself by functional alteration or organic disease of other parts.

Gentlemen, we recognise the presence of disease in the digestive tube, first by the local phenomena and the lesion of the digestive function, and next by the sympathetic relations of other parts, by the sympathies of the respiratory system, of the circulation of the skin and of the nervous system. I shall enumerate the local phenomena and functional lesions: vomiting, anorexia, thirst, jaundice, pain, tenderness on pressure, tympanitis, changes in the character and quality of the discharges, constipation. Here are a set of functional lesions and local phenomena, let us now consider the sympathetic relations; these are fever, heat of skin, suppression of the cutaneous secretion, suppression of the secretion of urine, morbid states of the tongue and pulse, pains in the chest and cough, hurried breathing, and palpitations of the heart. In the next place, we may have prostration of strength, delirium, coma, convulsions, tetanic spasms, and other symptoms of functional disease of the brain; these are all sympathies of relation. Now, in the first place, I have to remark, that there is a great deal of variety in the combination of these symptoms. On what does this depend? on a variety of circumstances; sometimes on the intensity or extent of the inflammation; sometimes on the situation of the disease; sometimes on the complication of the affection; sometimes on the various modes and degrees of susceptibility of the individual. All these causes tend to produce a great variety in the disease, and an extensive modification of the sympathetic relations. For instance, in some cases, inflammation of the stomach and intestines is so slight that the patient is not prevented from going about and pursuing his ordinary avocations; in others, on the contrary, the patients are struck down at once by the violence of the disease, and are carried off by the fever which accompanies it before the inflammation is completely developed. It varies also according to situation; there is a difference between gastritis and dysentery, in the former we have an inactive state of the great intestine, and consequent constipation in the latter, the colon is thrown into violent action, and there are frequent dejections. Disease of the duodenum is attended with a very remarkable peculiarity, being very frequently complicated with jaundice; here is a modification produced by situation. Again, inflammation of the ileum is attended with a very curious peculiarity, namely, the absence of pain. The patient states, that he feels unwell, he has obscure symptoms of intestinal disease, but it is neither dysentery nor gastritis; you investigate it with care and find that the ileum is in a state of inflammation. Yet the patient does not complain of any pain, and this is another peculiarity depending on situation.

But in considering the differences which depend upon intensity, extent, and situation of disease of the intestinal canal, we must not omit those which depend upon tissue. If disease be confined to the mucous membrane of the intestines alone, we may have an extremely diffused and extensive inflammation sufficient to destroy life, without any pain being complained of by the patient, it is a painless though fatal disease. Recollect this, extensive and fatal inflammation without pain. In former times the ideas of pain and inflammation were

inseparable. Thanks to the light which pathology has shed upon modern medical science we are now acquainted with this seeming anomaly, and can conceive the existence of extensive disease of mucous surfaces unaccompanied by pain. But let the inflammation seize on the muscular tissue, the character of the disease is instantly changed, and the pain is dreadful. Here is a case in which difference of tissue is to be taken into consideration.

The phenomena and sympathetic relations of intestinal disease may vary also according to its complication, and here we come to investigate one of the most beautiful laws of the human economy, namely, that the more complicated a disease is the more latent will be any local lesion. This is a point that should never be forgotten. For instance, enteritis by itself is much more easily recognised than when complicated with pneumonia, or with irritation of the brain, and gastritis is but too often completely masked by being combined with irritation of the bronchial mucous membrane. Lastly, we have the varieties which depend on different degrees of susceptibility. In one person we may have only slight cerebral irritation, in another high excitement, in a third delirium and extraordinary convulsions. The variety, then, in the modifications of disease, and the combination of sympathies is very great, and is referable to the extent and the intensity of the inflammation, difference of situation, complication of disease, difference of tissue, and different degrees of susceptibility. I shall give examples of these at my next lecture, and then proceed to the pathology and treatment of gastritis.—*Lond. Med. and Surg. Journ. January 4th*, 1834.

MATERIA MEDICA.

21. *Formulæ for Preparations of Hydriodate of Iron.*—M. Pierquin who has successfully employed the hydriodate of iron in amenorrhœa and leucorrhœa, has published in a recent No. of the *Bull. Gen. et Therap.* the following formulæ:—

1st. For pastilles. ℞. Hydrod. ferri, ʒj.; pulv. croc. sativ. ʒiv.; sacch. alb. ʒviij. M. fit. 240 pastilles. 8 or 10 grains to be given daily, and the dose gradually increased.

2d. Tincture. ℞. Hydrod. ferri, ʒij.; alcohol, aq. puræ. āā. ʒij. M. A tea-spoonful night and morning for an adult.

3d. Enemata, injections and lotions. ℞. Hydrod. ferri, ʒiv.; aq. puræ. Ibij. M.

22. *Ointment for the Cure of Porrigo.*—M. Biett considers the following as one of the most powerful agents for the cure of porrigo:—℞. Ioduret. sulph. ℈j. to ʒss.; axung. ʒj. M. A drachm is usually employed at each friction.—*Bulletin Gén. de Therapeutique, Tom. IV.*, 1833.

23. M. Aubergier's *Pomatum for Preventing the Hairs from Falling Out.*—℞. Prepared marrow of beef, ʒvj.; sweet almond oil, ʒij.; red Peruvian bark, ʒj. The powdered bark is to be moistened with a small portion of the almond oil, and the remainder then added; when the mixture is made, the marrow is to be melted at a moderate heat, and gradually added to the preceding ingredients in a mortar, and rubbed together until cold. It is asserted to have never failed in preserving the hair.—*Ibid.*

24. *Improved Method of Administering Epsom Salt.*—Dr. James Henry, of Dublin, recommends the sulphate of magnesia given according to the following formula as an agreeable, safe and efficacious purgative. Saturate any quantity of cold water with sulphate of magnesia; filter through paper, and add to every seven ounces of the solution one ounce of the *dilute* sulphuric acid of the Dublin or Edinburgh pharmacopœias.

Dose.—One table-spoonful in a wine-glass of water.*

In those cases in which the bowels are very easily moved, a single table-spoonful is sufficient to produce a considerable purgative effect.

In ordinary cases, a table-spoonful taken an hour or two before breakfast produces one or two evacuations immediately after breakfast.

In other cases, the dose is to be repeated once or twice, at intervals of two or three hours, according to circumstances.

Where the symptoms are urgent, a table-spoonful may be given every hour until the effect is produced; and where the urgency is extreme, a saturated solution of the salt, containing only one-half of the above-mentioned quantity of acid, may be given in doses of two table-spoonfuls, repeated every hour.

This combination of sulphate of magnesia and sulphuric acid, administered according to the preceding directions, possesses the following properties.

1. It is an effectual purgative, never failing to move the bowels in all cases in which the bowels can be moved by medicine. I am not acquainted with any purgative which is more certainly effectual.

2. It is quick in its operation; the effect being produced in ordinary cases within two or three hours after the first or second dose, and a necessity rarely arising for the continuance of the medicine beyond the third dose.

3. It is safe, never purging so as to produce exhaustion.

4. It does not give rise to the slightest degree of nausea, but, on the contrary,

5. Quickly puts a stop to nausea, and appeases irritability of the stomach.

6. Flatulence, that most distressing attendant upon constipated bowels, is immediately and signally relieved by this medicine, which not only promotes the expulsion of the *flatus* already generated, but diminishes the tendency to its further secretion.

7. In a few minutes after this medicine has been swallowed, so agreeable a sensation of warmth is felt in the stomach, that the medicine is not only readily taken, but even relished by many persons whose stomach will not retain any other liquid purgative, unless impregnated with the hottest aromatic tinctures.

8. The operation of this medicine is not attended by either sickness, faintishness, or griping. In this respect the acid saline solution possesses a remarkable superiority over all the purgatives in common use.

9. This medicine can be taken every day, or every second day, for a considerable length of time, not only without impairing the stomach or other digestive organs, but with manifest advantage to them.†

10. The continued use of this medicine does not produce that irritation of the *rectum* which so commonly attends the continued use of other purgatives.

11. This medicine is not disagreeable to the sight, being perfectly limpid and transparent as the purest spring water.

12. It has no smell.

13. The bitter nauseous flavour of the sulphate of magnesia being almost completely hidden by the acid, the taste of the solution can hardly be said to be at all disagreeable, and is certainly much less so than that of most other liquid purgatives.

14. It is cheap.

15. It is easily procured everywhere.

16. It keeps for an unlimited length of time.

From the experience of three years, during which I have made daily use of this purgative in the course of my practice as a physician, I have ascertained that the acid saline solution possesses the properties which I have just enumerated.—*Edin. Med. and Surg. Journ. January*, 1834.

* Each table-spoonful contains about two drachms of sulphate of magnesia, and half a drachm of dilute sulphuric acid.

† The frequently repeated contact of the acid saline solution being injurious to the teeth, it is useful to adopt the precaution of taking the medicine through a quill, or from the spout of a small tea-pot, whenever it is necessary to continue its use for any length of time.

25. *On a preparation of Opium.* By J. C. Boswell, Esq. Assistant Surgeon, Penang.—I have been using for a considerable time past, in the Hospitals under my charge, a preparation of opium as a substitute for the liq. opii sedit. and tinct. opii, which I now beg leave to bring to notice, as I feel desirous to obtain the opinion of others relative to its virtues. The preparation I am now using, was made soon after I was put in charge of the Medical Stores.

Having occasion to make a quantity of the tincture, I felt at a loss what to do with the residue after the tincture had been strained, when on reference to Paris' Pharmacologia, (see Note, Art. Opium,) it is stated, that Mr. Haden had macerated the dregs in a solution of tart. acid. and had found the product as strong, and superior to the tincture, inasmuch as it was devoid of either stimulating or binding qualities. After the trials I have made, I think I can almost confirm that statement.

My solution was made by adding about two-thirds the quantity of water, which I had previously obtained of tincture, with what I deemed sufficient of tart. acid. the solution was frequently shaken, and left for a month, then filtered. The dose I usually give is, from gtts. 50, to ʒj.—*Trans. of Med. and Phys. Society of Calcutta, Vol. VI.*

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26. *Opium used at the General Hospital, Calcutta.* By W. Twining, Esq.—I have used the opiate solution sent from Penang by Mr. Boswell; the quantity would not allow of any to be spared for chemical analysis, so as to ascertain the relative proportion, and exact nature of the solid matter in this medicine. It would be desirable to ascertain from Mr. B. whether the dregs left after the preparation of laudanum, were used in making this medicine in a wet or dry state;—also, what were the exact proportions of tartaric acid and water employed.

The whole of the solution was administered to sick and convalescents in the General Hospital, and it appears to possess considerable efficacy: its anodyne and soporific properties do not seem equivalent to half the strength of vin. opii; but its action is peculiar, and if the present trials will enable me to judge correctly, I should state that it is a less exciting opiate than laudanum, when administered to patients in an irritable condition, and suffering from a slight degree of pyrexia; it is less liable to affect the head, or to produce constipation of the bowels, and is seldom or never followed by disorder of the stomach or impaired digestion, and it has a greater tendency to produce perspiration, than either laudanum, or vin. opii. Patients who had been in the habit of taking large quantities of laudanum, were unwilling to acknowledge that the opiate solution, now alluded to, had any evident effect either in the dose of one or two drachms.

Since the above report was drawn up, I have obtained twenty-one pints of anodyne solution prepared by dissolving ʒxxi. of tartaric acid in twenty-one pints of distilled water, which was carefully mixed with the dregs left after making sixty-three pints of laudanum, according to the formulæ of the London Pharmacopœia. Jeremie's opium was used in making the laudanum, and after it was filtered, the whole of the dregs were left on the filter for fourteen days; being then in the state of a tough paste, and about as firm as an ordinary mass for making pills, the above solution of tartaric acid was mixed with the mass, and the fluid stirred daily for fourteen days, and then strained. The relative proportion of water is only half as much as Mr. Boswell used. The medicine prepared in this way is about as high-coloured as equal parts of claret and water: it is transparent, and a mouldy coat forms on the top of the fluid in each bottle in the course of ten days.

I have used the whole 21 pints of this solution in cases of severe pains of the bones and joints, affecting men who were emaciated and had broken constitutions from long residence in India, and from the frequent use of mercury. These patients were the military invalids who arrived this season from the Upper Provinces, in the course of transmission to Europe. The medicine was of the greatest benefit to patients of this class, who earnestly requested its re-

petition after having once experienced its effects. It was usually followed by a warm perspiration extending over the whole body and extremities; and the patients procured more refreshing sleep than after any other opiate. I believe its exhibition never caused head-ache, and it seldom or never produced constipation of the bowels: in upwards of 40 patients who took this medicine, only one complained of constipation. In one case of most excruciating pains arising from irritable ulcers of long duration, the patient procured comfortable sleep, and was entirely relieved of his pains by doses of ʒiv. of this solution given every night at bed-time. This patient is a Greek, who had formerly used large quantities of opium. Another patient with irritable ulcers and severe pains in his limbs always slept well after taking doses of ʒiii. every night. No other patient required a larger dose than ʒii. I have administered this preparation of opium, with great benefit, in the dose of ʒss. twice a day, combined with ten minims of Fowler's solution of arsenic, in some cases of irritable ulcers; and in irritable eruptions of great obstinacy and long continuance; in which many other remedies had previously produced no evident benefit.—*Ibid.*

PRACTICE OF MEDICINE.

27. *Sulphate of Quinine and Tobacco taken as Snuff in the Treatment of Intermittent Head-aches.*—Dr. D'Hue says, that he has employed with success in intermittent cephalalgias, a snuff composed of fifteen grains of sulphate of quinine mixed with an ounce of tobacco. The whole is to be taken during the course of five or six days.—*Rev. Méd. May*, 1833.

28. *On the Employment of Chlorine in Pulmonary Affections.*—The *Transactions Médicales* for February, 1833, contain an interesting article on this subject by Dr. Bourgeois. This physician having seen two apparently desperate phthisical patients relieved, without being submitted to any medical treatment, but who resided at a bleaching establishment near St. Denis, the atmosphere of which is impregnated with chlorine, was induced to form a similar atmosphere in the chambers of some young phthisical patients in the Royal School at St. Denis. This medication, though it did not cure these patients, ameliorated their condition, diminished their dyspnœa, promoted sleep, gave them appetite, destroyed the fœtor of the sputa, and changed it from sanious to mucous. These advantages lead M. B. to hope that in the earlier stages of the disease it may effect a cure; in those in which it was resorted to by M. B. there were large purulent collections in the lungs.

29. *Iodine in Mercurial Salivation.*—In our last No. we stated that iodine had been successfully employed in Germany as a cure for mercurial salivation. We are now enabled to furnish some further details as given by Dr. Kluge of Berlin, in *Hecker's Medical Journal.*

"Professor Knod Von Helmenstreitt, in Aschauffenburg, was the first who recommended *iodine in mercurial salivation.* (See Hufeland's Journal, May, 1832.) As the syphilitic wards of the great hospital, (Charité,) in Berlin, afford numerous examples of this affection, I determined to give iodine a fair trial, and for this purpose I selected seventeen cases, viz. twelve women and five men, all of whom laboured under severe mercurial salivation. Helmenstreitt's first directions were to dissolve five grains of iodine in two drachms of spirit of wine, to which two ounces of cinnamon water, and half an ounce of syrup are to be added. Of this the patient was to take at first half a tablespoonful four times a day, which dose was to be gradually augmented two, four, six, or even eight grains daily. His latter directions prescribed two grains, or even more, the first day, which dose was to be rapidly increased.

"Two young women who lost four or five pints of saliva daily, were cured

in three days by eight grains. One man and one woman got well in four days, having taken ten grains. In two men and four women the ptyalism ceased entirely in six days, during which each had taken from twelve to sixteen grains. In two men and two women the spitting was cured on the seventh day after iodine had been taken to the amount of from twenty to twenty-eight grains. In the latter cases it was, however, remarked, that the great pain of mouth and fœtor of the breath were notably diminished after one day's use of the iodine. In two young women the remedy appeared at first to be of little or no use; in both the salivation amounted to three or four pints daily at the termination of the seventh day, and the only advantage gained appeared to be a certain diminution of soreness of mouth. One of these patients was then obliged to desist from the use of the remedy on account of some constitutional symptoms, and I looked upon this case as a failure. This conclusion was however too hastily made, for the good effects of the iodine began to appear on the following day, and on the third day after she had left it off, that is, on the eleventh from the date of its first exhibition, all morbid secretion of saliva had disappeared, and the gums had very nearly recovered their healthy appearance; in short, the patient had recovered, having consumed thirty-four grains of iodine. In the other young woman we stopped the exhibition of iodine on the tenth day, at which time she had taken thirty-six grains, with the effect of diminishing the daily secretion of saliva from five to three pints. On the twelfth day she was well.

"In one girl the accidental occurrence of erysipelas of the face prevented the continuance of the remedy. The use of the iodine did not produce in any one of these patients any disagreeable or untoward symptoms, and as I kept them all for some time in hospital after the salivation had ceased, I have the pleasure of likewise testifying that the cure was not only safe, but permanent."

Dr. Graves of Dublin, has also tried the effects of iodine in arresting salivation, with favourable results.—*Dub. Journ. of Med. and Chem. Sciences, Jan.* 1834.

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30. *Treatment of Chronic Bronchitis.*—Dr. Craigie, in an interesting report on the cases treated in the Royal Infirmary, contained in our Edinburgh cotemporary for January last, states that the remedies under which recovery from bronchitis was most readily effected were, blood-letting from the arm to the amount of sixteen or eighteen ounces, followed by the detraction of blood from the chest between the shoulders, by cupping or leeches, or both, or from the anterior part of the windpipe by leeches, blisters between the *scapulæ*, and a mixture of squills and antimony, with opiates. In some Dr. C. found a powder consisting of one drachm of supertartrate of potass, half a drachm or a scruple of carbonate of soda, and ten grains of nitrate of potass, of great use in cases in which there was reason to apprehend, from the scantiness of the urine, that the disease was passing from the bronchial membrane to the submucous tissue, and beginning to effect the circulation of the lungs.

In several cases of the chronic disease Dr. C. tried the tincture of the *Lobelia inflata;* but in one only, in which other remedies were also used with benefit, did it seem to be productive of advantage.

In cases of chronic *bronchitis* of aged enfeebled subjects, with excessively profuse secretion of frothy mucous fluid, Dr. C. found acetate of lead and opium in doses of three or four grains of the former to half a grain of the latter, three times daily, of much use. This remedy required to be alternated with the use of the compound colocynth pill, or a small dose of castor oil every second or third day, according to circumstances, in order to obviate the effects of constipation.

Another agent equally powerful, and not so liable to injure, in the treatment of chronic *bronchitis* with profuse secretion, is according to Dr. C. the sulphate of zinc, with extract of *hyoscyamus* or opium; in doses of one or two grains of the former, to two or three of extract of *hyoscyamus*, and half a grain of opium.

Its effect is not merely to check undue secretion by its astringent power, but

by operating on the capillaries generally, and those of the bronchial membrane in particular, it tends to restore their natural properties, and propel their contents in the proper channels.

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31. *Remarks upon the Nature of Neuralgias, and their Treatment.* By M. Piorry.—As the vast majority of neuralgic affections do not terminate fatally, the lesions which they may produce in the nervous tissue, remain as yet almost unknown; and it is impossible for us to decide whether an irritation, or even indeed a hyperemia has, or has not existed. The larger proportion of cases of pharyngitis treated at the hospitals Salpêtriere and La Pitié, though exhibiting a short time before death all the symptoms of this affection, when examined after death, offered no traces whatever of the disease. If such is the case in inflammations of the mucous membranes, may we not with more reason attribute to the affections of the nervous system a similar series of phenomena. The morbid lesion which attacks the nervous trunk, may in like manner affect separately and independently the numerous filaments which enter into its composition, and which are so exceedingly minute, that the anatomist labours in vain to isolate them. How is it possible then, for us to decide upon the different shades or tints which these filaments may assume. This circumstance is deserving of recollection, for it is by the colour of the nervous matter of the brain, that the pathologist pronounces upon the previous existence of inflammation in this organ. The blood-vessels supplying these nervous filaments are also so exceedingly minute, that to be able to appreciate in them a state of hyperemia, it is necessary that they should be enormously enlarged. Moreover, the cellular tissue of a nerve, which connects its filaments to each other, may take on inflammation, and present a red colour, without the filaments themselves being at all concerned. The causes which operate in the production of neuralgic affections, are the same which produce in other organs irritation and hyperemia. A contusion, pressure, violent and sudden muscular contraction, a carious tooth operating as an irritant to the nerve supplying it, an organic lesion of the heart, an articular rheumatism, which, whatever may be said to the contrary, is in fact an inflammation of the joints; a tumour situated upon a nerve, an active inflammation of the surface of the body, extension of the inflammatory action from the intestines to the nerves supplying them, certain movements of the muscles of the head, acting upon some of the neighbouring nerves, extension of the irritation which accompanies cancer, and the pressure which an enlarged gland sometimes produces upon a nerve, are some of the appreciable causes which tend to produce these affections; and although we are unable to seize upon these, or similar ones in all cases, yet we should not conclude on this account, that they were not present, but rather ascribe to the imperfection of our means of investigation, their escape from our senses! The group of symptoms does not distinguish neuralgia from neuritis, only the one is transitory in its effects, whilst the other remains stationary for some time. This is to be attributed to the morbid action resting in the first case at its first or mildest stage, whereas, in the second, it passes on to its second, or most violent degree. Perhaps the one may be considered as bearing the same relation to the other, that a cerebral congestion does to a softening of the brain. This comparison, it is true, does not throw much light upon the nature of the case, for we have yet to form positive opinions relative to cerebral congestions and cerebral softenings; nevertheless, the analogy between the two affections is so strong, that it may be well to make use of the simile. Because the pain is not augmented by pressure, because it assumes various characters, because it may be subject to remissions, and because there is neither redness, heat, nor swelling, nor indeed any of the precursors of inflammatory action present, we must not conclude, that no congestion or inflammation of the nerve exists; for pressure does not always produce pain in cases of congestion or inflammation in other parts. Moreover, the hyperemias which succeed to a lesion of a nerve, or which may accompany it, are subject both to variations in

their nature, as well as to remissions. Again, from the nerve being invisible, it is of course impossible to observe the different changes in colour, the degree of heat, or of swelling which it may undergo; and finally, there are many cases of inflammation, in which none of the precursory or pathognomonic symptoms of this condition show themselves. M. Andral has well observed, that the symptoms given by authors as characterizing these affections, may lead us to mistake a neuralgia for a neuritis, and vice versa. He considers the best means of distinguishing the two affections from each other, to be the augmentation in volume of the nerve affected with neuritis, but unfortunately in the great majority of cases this augmentation cannot be detected. The results of different methods of treatment do not establish more definitely the differences that exist between the two diseases, for it has happened, that in cases which were essentially neuralgias, sanguine evacuations either produced an amelioration of the symptoms, or cured them completely, or changed them from continued to intermittent, and this too as speedily and as effectually as they did in cases which were considered as well marked neuritis. On the other hand, the sulphate of quinine operated very beneficially in a case, the intermittent symptoms of which seemed to be dependent upon neuritis, which had originally been accompanied by a physical lesion of the nerve, (a neuroma.) It most frequently proves useful in those cases in which the previous application of leeches had produced decided relief. Hence, even admitting theoretically, that the neuralgic affections constitute two degrees in the lesion of a nerve, or even that they are essentially different in their nature, it must be confessed, that neither the pathological phenomena, nor the symptoms, nor indeed the treatment, furnish signs sufficiently well-marked to induce us to form very different therapeutic indications for these two morbid conditions.

The same remarks apply to the efforts which have been made to establish a diagnosis between neuromyelitis and neurilemmitis. The observation of Riel has been copied by every one, without its truth having ever been properly ascertained; it would have been much better to have tested its truth by repeating his experiment, and until it is positively shown that the neurilema of a nervous filament may take on a state of inflammation, whilst the pulp it contains remains unharmed, and vice versa, we cannot give credit to the subtle divisions made of this class of diseases, which divisions were certainly never deduced from sound pathological investigation. The neuromas mentioned by Galen, Valsalva, and Petit, and upon which MM. Dupuytren, Alexander, Boisseau, Beclard, Descot, Andral, Schiffner, and Cruveilhier, have published such important and interesting observations, seem in some cases to be dependent upon the previous existence of some cancerous affection, and in others to result from the morbid action which constitutes neuralgia and neuritis, which affections in turn make their appearance. Their symptoms are the same, though the treatment is different, for in these cases we know positively the situation of the organic lesion, and also that where other remedies have failed, an operation is absolutely required to effect a cure. There are, however, certain distinctions which may be drawn between the neuralgias and the neurites, according to the nature of the causes producing them, or the peculiar nerve attached. M. Lembert, who has published some very useful observations upon the endermic method of medication, is induced to believe from several facts which he has noticed, that certain nerves, which he thinks are more vascular than others, and which preside over the functions of touch and nutrition, such for instance, as the branches of the fifth pair, are more disposed than the other nerves of the body to attacks of neuritis, and less to attacks of neuralgia, and that sanguine emissions are more useful in the first class than in the second. Experience and future observation upon the functions of the different nerves must decide the merits of this opinion. In all cases where the nerve undergoes a morbid alteration sufficiently violent to give rise to symptoms, a peculiar pain, which is propagated through all the nervous ramifications, and which in some cases seems to proceed from the branches to the trunk, manifests itself. The sensation

produced, is that of stiffness or painful numbness, accompanied by a pricking and vibratory feeling, which continues a longer or a shorter period, according to the nature of the circumstances that determine its production. If the exciting cause suddenly ceases to operate, and if the lesion sustained by the nerve has been trifling in its extent, the pain gradually subsides, and in a short time every thing reässumes its original healthy action. (The pain caused by pressure of the cubital nerve at the elbow-joint, or of the sciatic nerve where it emerges from the pelvis, or in the popliteal space, and that produced by the pressure of the child's head during labour, may be cited as examples of this kind.) If, however, the exciting cause is more violent in its operation, the painful sensations continue for a longer time, or should they perchance abate or disappear for a time, soon return. The exacerbations take place from time to time, and in some cases obey the law of periodicity, for in disease, as well as in health, the nervous functions possess a tendency towards intermission. (The pain caused by a carious tooth, constituting odontalgia, that produced by cancerous tumours in the arm-pit and uterus, which irritate or compress the nervous trunks of the arm and thigh, &c. may be placed among the examples of this species.) In these cases the pain persists as long as the cause producing it continues to operate, and is incurable unless the latter be removed. The pain which is at first confined to the trunk, or filament affected, may gradually extend itself to the neighbouring nerves, (odontalgia following some of the various neuralgias of the face,) or it may make its appearance in several points of the nervous system at the same time. In these cases the secondary neuralgic symptoms may generally be relieved, but it is not until the primitive affection is recognised and eradicated, that we can trust to their non-appearance again. Consecutively to the operation of either a transitory or persistant cause, the nerve may become the seat of a simple irritation, which cannot be conceived to occur, except in cases of anemia or chlorosis, without a congestion of the sanguine capillaries, since all organs in a state of excitation have their capillaries injected. In this case, however, we are obliged to acknowledge the existence of such a state of things, by analogy alone, since it is impossible to examine the peculiar condition of the nerve during life, and if examined after death it does not present the same characters, which it would have done if observed during the existence of pain. Yet in cases of iridian or ophthalmic neuralgia, as soon as the symptoms declare themselves, the eyelids and the neighbouring parts are found to be in a state of congestion; if the disease is confined to this degree of excitement and primitive congestion, we have only a neuralgia produced. When an attack of neuralgia has existed for any length of time, it frequently happens that there exists great tendency to a relapse, notwithstanding the original cause of its appearance has been completely eradicated. It seems in these cases that the system acquires a sort of habit, which it is extremely difficult to overcome. If the cause has operated with violence, or is continued for any length of time, or should the disease be augmented a degree in intensity, an inflammation of the nerve may be the result. The neuritis thus brought about may be either followed or accompanied by hypertrophy of the nerve; by a deposition of blood or pus between its filaments; by the formation of hard or scirrhous tumours in its substance; or of small cysts, the parietes of which are hard, and contain a sort of gelatinous fluid; or of encephaloid degenerations, &c. The pain experienced in the nervous trunk, or in its filaments, is so peculiar in its character, that it is impossible to confound it with any other. *It resembles precisely that which is perceived when the inner side of the elbow-joint is suddenly pressed upon or struck.* In doubtful cases of chronic rheumatism or gouty arthritis, or of musculitis, &c. the abscence or presence of this peculiar sensation will decide at once the character of the affection, and it is important to bear in mind this fact in the examination of our patient.

Treatment.—Reasoning from the facts just given, the indications to be observed, and the course to be pursued in the treatment of neuralgias, seems to be as follows. 1st. Endeavour by all possible means to find out the material

or organic cause which has produced, or which is at the time operating in the production of either the neuralgia or neuritis, and destroy it if possible at once.

Examples. (Extract the carious tooth in odontalgia dependent upon its irritating properties; prevent certain muscular movements which seem to operate in the production of the disease; remove tumours situated upon the nerve, &c.) should the organic cause be entirely beyond the reach of our therapeutic agents, (as for instance in cancer of the uterus determining nervous pains,) we must content ourselves with the administration of such palliatives as we may possess. If the disease still persists after the removal of the cause which produced it; or should the cause escape our means of investigation; or the attack be of recent occurrence, or even chronic in robust subjects, and sometimes also in persons of a nervous temperament; it will be well, before resorting to any other method of treatment, to try the effect of antiphlogistic remedies. The extent to which these should be carried, must of course depend upon the quantity of blood the patient can afford to lose; which circumstance may be determined by an examination of his arteries, veins, and capillary circulation, and by the percussion of such organs as are highly vascular, and capable of containing large quantities of blood. General blood-letting which proved so successful in the hands of Cotugno, may occasionally be resorted to; but copious local depletion effected by the application of a large number of leeches along the course of the affected nerve, together with rest and poultices, repeated pro re nata, is the course of treatment usually pursued in this stage. Those who doubt the efficacy of sanguine evacuations in such cases, have either not properly studied their effects, or have seen them employed with too much rashness, or with too great timidity. What have we to fear from blood-letting? Is it the momentary debility which it produces? If the precautions which we have elsewhere indicated are observed, the syncope can never become so excessive as to prove dangerous. (Vide *Procede Oper. de la Percussion, &c.* p. 249.) Is it consecutive debility? If, in the first instance, we do not establish in the system a dangerous degree of debility, by extracting too large a quantity of blood, is there any reason why we should anticipate the occurrence of a consecutive one? Is it the tediousness of the convalescence? This will only take place when the patient is confined to a vigorous diet. At La Pitié, where sanguine emissions were carried to a great extent, but the patient at the same time properly nourished, the transition from a state of disease to perfect health, was, in the majority of cases, almost immediate. Moreover, the animals used in the experiments on this subject, and from whom large quantities of blood were extracted, speedily regained their usual quantity of this fluid. We should not, therefore, doubt the importance of blood-letting in these cases, but it is true that it must be conducted with prudence, and with a proper knowledge of its effects. In the hands of those familiar with its powers, it can never prove dangerous; it only becomes so when ordered by the inexperienced and rash. If the symptoms are ameliorated by this plan of treatment, it should be continued; but we must recollect, that although sanguine emissions when early prescribed are not generally productive of danger, it is not so with those used at a later date. We should, therefore, be guarded in ordering a repetition of this evacuation. These remedies alone frequently prove sufficient to effect a radical cure. When the antiphlogistic remedies have been tried without success, and where the disease does not manifest a tendency to assume an intermittent type, we may resort to the application of vesicatories along the tract of the nerve, according to the plan of Cotugno, which in his hands was very successful. The blister should be allowed to remain but a short time in one spot, and must then be applied to another in the neighbourhood. The form of the blister is also of some importance. In general it should be long and narrow, so as to apply itself to the part of the nerve. Almost every practitioner has witnessed the success of this remedy. In several instances, however, the blister has failed to produce the anticipated effect; we may here denude the cutis of its cuticle, and resort to the endermic method of medication. The narcotics, for instance, the acetate, and

particularly the hydrochlorate of morphia, the stramonium, belladonna, henbane, &c. may all be resorted to. In some cases we have found this method prove exceedingly useful, in others again it has entirely failed. A woman of the Salpêtriere had complained for several days of an acute pain in the temple, which seemed to be neuralgic in its character; a blister was ordered to be applied to the part, for the purpose of removing the cuticle, and the denuded cutis to be sprinkled over with a grain of the hydrochlorate of morphia. The day after the application of the blister, the patient expressed himself as entirely relieved. All the benefit derived was attributed to the application of the opium; it was found afterwards, however, that the opium had not been applied, and that the blister alone had effected the cure. To avoid for the future, attributing to the absorption of some remedy, that which is due to the operation of the blister alone, it would be well to apply the blister in a strip of about two lines breadth, and then place the narcotic upon the denuded surface, which of course will be exceedingly small. When the narcotic, opium, for instance, has failed when applied externally in producing its effects, we may exhibit it internally, either in the shape of an enema, or in a draught. These means, however, though they generally produce a momentary alleviation of the symptoms, rarely effect a radical cure. Should the symptoms appear periodically—whether after the lapse of a day or of several weeks, or of several hours, or even less time; if from the influence of sanguine emissions, the disease changes from a continued, with occasional exacerbations, to an intermittent form, we may resort to the administration of the sulphate of quinine in large doses, as if it were a case of intermittent fever! We must not trust to small doses, but give it in doses of ten, fifteen, and twenty grains; the largest dose being given immediately after the occurrence of the attack. If the succeeding paroxysms should be milder in their character, or the interval between them increased, we may either continue in larger doses the sulphate of quinine, or suspend its employment for several days, in order to be able to resort to it suddenly in very large quantities. In some cases it has seemed to me, that a repetition of the local sanguine emission during the paroxysm has been productive of benefit; and that the sulphate of quinine administered immediately afterwards operated more efficaciously upon the approaching attack. In cases of amenia, where the skin and lips are pale, and in young women whose organs contain but little blood, the sub-carbonate of iron sometimes produces the most happy effects, particularly in cases accompanied with irregular menstruation, and where the menstrual blood is paler than usual. Here we must be very cautious how we prescribe sanguine depletion. As the brain, in cases of syncope and anemia, frequently exhibits symptoms precisely similar to those produced by a congestion of its substance, in like manner may the nerves, in cases where there exists a deficiency of blood in the system, should they perchance become irritated, be accompanied by all the symptoms of irritation with congestion. When all our means have failed, and the treatment founded upon rational views of the disease proved unsuccessful, we might then have recourse to empirical remedies. The best to commence with are those which are supposed to operate with most safety to the patient. The pills of Meglin have sometimes proved useful; the essential oil of turpentine has also produced beneficial effects in the practice of M. Martinet. Finally, cauterization of the nerve, as practised by André, or its section which Galen is said to have resorted to, and which Nuck so highly recommends, and which in the hands of MM. Maréchal, Louis, Pouteau, Guerin and Delpech, has produced such varied effects, may be tried. Several very interesting observations upon this latter method of treatment, as well as many important facts in the history of the neuralgia's, will be found in a very remarkable and exceedingly erudite memoir, that has just been published by M. Halliday.—*Gaz. Méd. de Paris, February 2d*, 1833.

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32. *Efficacy of Madar, (the powdered Bark of the Root of the Asclepias gigantea,) in Extensive and Obstinate Ulcers in Native Patients.*—A letter from J. L.

Geddes, Esq. Assistant Surgeon, Madras Service, was read at the Society's meeting on the 4th Feb. 1832, containing the statement of a case in which the madar had proved remarkably successful in the cure of an obstinate ulcer. The patient was a Sipahee, of an Infantry Corps, who appeared to be of a scrofulous diathesis. The disease had existed for a year, and the patient had been at Masulipatam six months, to try the effects of change of air, before he came under Mr. Geddes' care. All former treatment had failed. The ulcer was of an unhealthy appearance: situated on the upper and outer part of the left hip, extending from the trochanter major, over the situation of the gluteus maximus muscle, in a circular form, being in circumference upwards of sixteen inches. The madar was administered in pills, in the dose of four grains, three times a day. By the time that a drachm and a half of the medicine had been taken, the sore assumed a healthy aspect, and began to cicatrize. After a few days there appeared some disposition at the upper part (where cicatrization had taken place) to ulcerate again. The madar was continued until another drachm was taken, and the sore was completely cured. The medicine did not appear to produce any effect on the constitution, except causing the sore to heal. No other remedy, either external or internal, was used at the same time with the madar, except a little simple ointment, which was spread over the surface, to prevent abrasions of the newly-formed skin; and a purgative was occasionally administered, so that the efficacy of the remedy was unquestionable.

A letter from Dr. H. Mackenzie was read at the Society's meeting, on the 3d of December, 1831, relating the case of a native boy, of Sandoway, aged 13 years, who had been ill about twelve months with inveterate ulcers. The bones of the left forearm were bare and in a state of caries; there were numerous ulcers affording a very profuse discharge, and sinuses about the forearm and elbow; the patient was miserably reduced, and unable to stand; he had tried all the ordinary resources of the district without benefit. The madar powder was given twice daily, at first in doses of two grains, and afterwards gradually increased to five grains, twice a day; in which quantity it produced uneasiness and a disturbed state of the bowels; therefore the dose was reduced to three grains. The beneficial effects of this medicine were very evident in a few days: at the end of a week the boy's health was decidedly improved, and the profuse discharges from the ulcers had decreased; the decayed portions of bone were then extracted. At the end of five weeks from the time he began to take the madar, all the sores had healed, and the boy was able to walk about. Dr. Mackenzie ascribes the early improvement of this boy's health, and his ultimate recovery, to the "restorative and invigorating properties of small doses of madar; which remedy was left to produce its individual effects, without the exhibition of any other medicine, capable of modifying them in any degree."—*Transactions of the Medical and Physical Society of Calcutta, Vol. VI.*

SURGERY.

33. *Extirpation of a Necrosed Clavicle, followed by complete Reproduction of the Bone.* By Dr. Meyer, Surgeon to the Hospital of Zurich.—Cases in which complete reproduction of the bone follows the excision of a diseased clavicle, are of extremely rare occurrence. Windmann mentions but one instance of the kind, Meyer two, and Mott one. The following observation is therefore important.

G. Menne, æt. 31, of a feeble constitution, had been subject from infancy to scrofulous ulcerations of the neck. In June, 1823, he was seized with violent pains, resembling the rheumatic in the right arm, for which he was treated by several physicians, but without any relief being obtained. The pain continued to increase; and finally, whilst on a visit to the baths of Baden, a tumour formed in the right axilla, which opened of its own accord, and from which an acrid,

ichorous fluid was discharged. General debility now supervened; his appetite disappeared; in short, all the symptoms of hectic developed themselves, and he was received into the Hospital of Zurich in the following condition, on the 8th of October, 1823. Great emaciation; feeble appetite; sleep imperfect, and frequently interrupted by violent cough, and hectic fever. An ill-conditioned ulcer existed opposite the acromial extremity of the clavicle, which bone was in part denuded. The probe penetrated readily about an inch along the upper face of the clavicle, which was found rough and uneven to the touch. In the centre of the sternum there existed a fistulous orifice, through which a probe might be passed from below upwards about an inch; the bone however was in a sound condition. Finally, a fluctuating tumour was discovered between the eye-brows. For fourteen days tonic remedies internally administered, accompanied at the same time by frictions, with volatile liniments, were prescribed. The ulcer was dressed with charpie soaked in tinct. of myrrh, and the bone moved daily with the forceps. The forces of the patient by these means improved; his appetite and sleep returned; the fever became less intense; the cough not so harassing; in short, he was so much improved, that I ventured to lay bare, by an incision, the acromial extremity of the clavicle, and extract a small portion of it with the forceps. By this means the acromial extremity was more completely exposed, and an attentive examination showed that the bone was denuded as far as its centre. About the fifteenth day the bone seemed to be a little looser, though it appeared nevertheless to be firmly united with the surrounding soft parts; its sternal extremity was also still strongly held by its capsule. At this time the constitutional symptoms increased in violence so rapidly, that I determined to operate at once.

The patient's arm being drawn forcibly forwards, in order to separate the clavicle as much as possible from the vessels which course along its posterior and inferior surfaces, I proceeded to divide with the bistoury the integuments and muscular fibres covering the anterior and inferior margins of this bone, then drawing it, (the clavicle,) as much as possible forwards, I separated it, partly with the fingers, and partly with the knife, from its connexions behind and above. I next proceeded to open the capsule of the sternal articulation, in doing which, whilst drawing the bone forcibly forward, the latter snapped off near its sternal extremity; the fragment which remained attached to the sternum was however easily separated from its adhesions and extracted. The operation occupied about five minutes, and was accompanied by little or no hæmorrhage. The patient already exceedingly feeble, sank into a state of exhaustion, from which however he was recalled by the administration of stimulants, &c. On the third day after the operation, suppuration of a healthy character established itself, and in the course of seven weeks the wound was completely cicatrized. After a time the tumour on the forehead was opened, and the bone found to be in a carious condition. This, however, as well as the fistulous orifice of the sternum, was in a short time cured. By degrees the patient's general health was reëstablished; the arm resumed its natural position; and in place of the clavicle extracted, a bone of recent formation, having precisely the form of a healthy clavicle, though apparently more delicate than natural, could be distinctly felt occupying the position of the original bone. He could also execute with the arm all the motions of circumduction, and daily employed himself in some manual labour. Up to 1828, the patient was enabled to attend to his affairs; at this period he was attacked with a pulmonary affection that carried him off in a short time.

Autopsy.—Between the clavicular socket in the sternum, and the point and superior margin of the acromion, there existed a fibrous, almost cartilaginous ligament, containing several ossified points, upon which rested the inferior surface of the recently-formed clavicle. The space comprised between these two points, and occupied by the ligament just mentioned, was four inches six lines in length. The new bone was three inches ten lines in length, delicate, flattened towards the sternum, and more rounded towards its acromial end.

The sternal extremity was larger and thicker, and united itself to the corresponding sternal facet by a well-marked articulating head. The bone terminated about an inch from the acromion in a thick apophysis, between which and the acromion there extended a broad, thick ligament, containing several ossified spots. The upper border of the clavicle was convex towards the sternum, concave towards acromian, and well-rounded throughout. The inferior margin, on the contrary, was rough and studded with small ossified points, which projected into the ligament below.

The author assigns as the organ of reproduction in this case the periosteum of the old bone, notwithstanding it had also undergone some morbid alteration from the effects of the disease.—*Gaz. Med. de Paris, Sept. 28th*, 1833, *from Graefe und Walter's Journal.*

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34. *Reduction of a Double Luxation of the Inferior Maxillary Bone, thirty-five days after the occurrence of the Accident, effected by a New Method of Treatment.* By Dr. Stromeyer.—The instrument invented by Dr. Stromeyer for this case, resembles very much a pair of strong steel forceps, the branches of which, instead of crossing each other as usual, are united at one end by means of a screw. This is so arranged, that whilst the ends containing the screw are made to approximate, by turning the latter, the other extremities will be separated from each other in proportion to the number of times the screw is turned. These terminate in two oval plates, (one for each branch,) covered with thick leather, which are intended to be placed upon the last molars of the two maxillary bones; when these are made to separate by means of the screw fixed in the other extremities, the bones of course will be forced asunder. The extremity of the screw is attached to the inferior branch of the forceps by means of another, which limits the degree of pressure exerted by the former; so that, should the force applied be found too great, it may be removed instantaneously and completely by merely turning the regulating screw. The following interesting observation will serve to explain the modus operandi of this very ingenious instrument.

Observation.—Amolie Elsner d'Elz, domestic, æt. 23, luxated the inferior maxillary bone on both sides in gaping. The accident occurred on the 7th of May, 1819. The physician of the family mistaking the nature of the case, treated her with opiates, frictions, sinapisms, &c. Another physician was called in, who recognised at once the nature of the accident, and attempted the reduction of the dislocation, in which operation he was assisted by three or four others, who had been called in to witness the case. Every attempt, however, failed to produce the desired effect, I now determined to make use of my instrument, with the design of breaking up any adhesions which the condyles might have formed with the surrounding parts, and of overcoming afterwards the resistance of the muscles by fatiguing them. Thirty-five days elapsed since the occurrence of the accident, and the inferior dental arch projected a little more than half an inch beyond the superior; they were, moreover, separated from each other at least an inch. The lips could, notwithstanding, be brought in contact with each other, and her voice had nearly acquired its original distinctness. Mastication alone was but imperfectly performed, the last molar teeth being the only ones engaged in it; deglutition remained unimpaired. The depression before the ears was well marked; and the swelling having entirely disappeared, the condyles could be distinctly felt in their new situation.

The instrument was introduced into the mouth, closed, and in such a manner that the oval plate of the upper branch rested behind the last molar teeth of the superior maxillary bone. The two branches were then separated, by turning the screw, at first rapidly, and then more gradually, in proportion as the resistance increased, resting a few seconds between each rotation of the screw until the pains produced had ceased. The last turn given the screw caused a peculiar cracking noise, as if the adhesions had suddenly given way. As the space between the two branches of the speculum, already equalled three-

quarters of an inch, the least turn of the screw produced the most violent pain; I therefore determined to stop the extension, leaving, however, the instrument in its present condition for some time. The whole time it was in operation was about one-quarter of an hour; I then closed it suddenly by unscrewing the regulating screw, and withdrew it from the mouth as quickly as possible. Dr. Wellhausen, who assisted me, now introduced his thumbs, previously enveloped in a piece of roller, in the mouth, and made use of the ordinary manœuvre for the reduction of this dislocation, whilst I pressed upon the heads of the condyles to favour their retrocession. The reduction was effected without being accompanied by the sudden or spasmodic closing of the maxillary bones, and owing to the relaxed condition of the muscles, the inferior dental arch still remained a little in advance of the superior; in the course of a few hours, however, a great amelioration in this respect took place, and a few days were sufficient to eradicate every vestige of deformity. The inferior dental arch regained its original position, and the patient recovered the entire use of the lower jaw. No relapse occurred.—*Gazette Médicale de Paris, Sept. 28th,* 1833.

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35. *Operation for Strangulated Inguinal Hernia, performed on an Infant eight days old.*—An example of this is recorded by Dr. Heyfelder, in the *Transactions Médicales,* for April, 1833. After the operation the child appeared relieved, but six days afterwards it was suddenly attacked with convulsions, which were succeeded by trismus, and the patient died. On examination, the intestines in the ileo-cœcal region were sphacelated and perforated. The strangulation had existed three days before the operation was performed, the delay during the last twenty-four hours having been caused by the parents.

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36. *Ligature of the Subclavian Artery below the Clavicle.*—A young man received a sword-thrust through the folds of the axilla, in a duel. The hæmorrhage was checked by compression, and in eight days the wound was nearly healed; but now unfortunately the bleeding returned, and although restrained for the time broke out afresh at different intervals. Professor Blasius of Hallé determined therefore to tie the subclavian artery, below the clavicle. The operation was performed on the 20th day after the accident; and although no particular difficulty was experienced in any of the steps, the patient had been so exhausted by the repeated losses of blood, that he died on the 2d day after. On dissection, the axillary artery and vein were found uninjured; the source of the bleeding had been from the circumflexa humeri posterior, and circumflexa scapulæ, the wound having penetrated from behind, through the tendon of the latissimus dorsi, upwards and forwards. The subclavian artery, at the point of the ligature, was well secured.

Dr. B. very correctly condemns in severe terms the early treatment of this case. Why was the artery not laid bare at once, and a thread passed round it? No time should be lost upon such an occasion; the delay of even six, twelve or eighteen hours may be most injurious; for if an inflammatory action, nay an inflammatory tendency be established around the wounded vessel, the risk of secondary hæmorrhage is tenfold increased. Dr. B. was called one evening to a young man, who had wounded his hand deeply in the morning; a bungling surgeon, who had seen the patient then, had crammed compresses and other trash into and upon the wound; a certain degree of inflammation had thereby already commenced, when Dr. B. applied the ligature; on the 4th day, the vessel had ulcerated; the bleeding returned; and a second operation was necessary. But should the wound heal partially at first, and the hæmorrhage not recur, till the 16th, 18th, or 20th day after the accident, when suppuration had been established for some time, not only are the difficulties of securing the injured vessel greatly increased, but also the chances of ulceration of its coats at the site of the ligature and consequent bleeding. The parts are much changed in their tissue, and are matted together, so that it is often not easy to distinguish between them; and moreover the artery is so glued to its sheath, &c. that it is scarcely possible to

isolate it satisfactorily. Still with all these disadvantages, the tying of the artery is much safer than the employment of any other styptic remedies; our prognosis however cannot be so favourable, as it would have been, after an earlier operation.—*Rust's Magazine.*

37. *On Sanguineous Tumours of the Cranium.*—The most common and least dangerous sort of these bloody swellings is when the blood is effused between the aponeurosis of the occipito-frontalis muscle, and the common integuments.—They are very often observed on the heads of new-born infants, and are no doubt caused by the severe contusion of the cranium, during its expulsion through the pelvis. This is the "caput succedaneum" of some German authors. In general, it may be easily discussed under the use of resolvent applications.

The second variety of bloody tumours of the scalp, and which is usually caused by contusions or other external violence, is that which has been described by M. Zeller under the name of cephalæmatomié. The blood is diffused between the aponeurosis and pericranium. The German and Italian writers have often confounded this variety with the former;—it is only on this supposition, that we can account for their differences of opinion with respect to the danger or not of these bloody swellings, and to the treatment which they have recommended; some advising the knife to be used, others trusting to discutient lotions.

The fluctuation is not so distinct as in the first-mentioned kind, and the blood becomes diffused more readily, so that it does not generally present the appearance of a depression in the centre, and an elevated hardened border round; signs which have sometimes led surgeons to suppose that there was a depressed fracture of the bone, when the effects of the bruise were nothing but an ecchymosed subcutaneous swelling. In this sort the aponeurosis sometimes form a solid cyst round the extravasated blood. Whenever the pericranium becomes detached from the skull the injury assumes a more grave importance;—we cannot with certainty predict that the bone may not become ultimately necrosed. But this is rare, and authors have no doubt often committed the error of supposing that the blood was in contact with the bones, when the investing membrane of the latter was quite entire and firmly adhering.

M. Velpeau mentions a case of a child, only ten days old, being brought to him for a supposed hernia of the brain.

A soft fluctuating tumour covered the greater part of the left parietal, part of the temporal, and almost the whole of the occipital bone. The dispersion of this swelling was easily effected in the course of a few days. It is quite an unusual occurrence, that the pericranium is detached from the bone in new-born infants, however difficult the delivery may have been, and however large the quantity of blood effused. Sometimes, indeed, when a true encephalocele does exist, we meet with bloody swellings, which have their seat next to the bone, on others parts of the head;—such cases are very generally fatal.

The third species of swelling is situated deeper than either of the preceding two. Chelius, in his manual of Surgery, published in 1827 at Heidelberg, places it in the diploe of the bones; M. Velpeau thinks that it more frequently begins between the bone and the dura mater, although a case mentioned to him by M. Lauth is more favourable to the other opinion. A man received a blow with a cudgel on the parietal bone; but little notice was taken of it, and in the course of a few days he appeared to have quite recovered. Several months after severe pains were felt in the part diametrically opposite; (are we to understand the parietal bone of the other side?) and it was judged proper to trephine the bone there; but no correct information as to the true nature of the disease was obtained by the operation. After death, a fungoid mass was discovered, of the size of a large walnut, flattened, and, as it were, encysted in the diploe of the bone, where the blow had been received.

M. Velpeau has seen two cases in which blood was effused between the dura mater and bone during accouchement. It is very probable that the blood retained in this situation may undergo certain changes and ultimately give rise to some of the cranial fungoid tumours.—*Journal Hebdomadaire.*

38. *Case of Compound Fracture of the Thigh, in which Amputation was Performed.* By R. N. Burnard.—The subject of this case was a boy, about 12 years of age, who, by a fall from a tree, had sustained a severe compound fracture of the right thigh, about one and a half or two inches below the trochanters. The accident had happened twenty days previous to his admission into the hospital on the 25th January, 1830, when Mr Burnard saw him for the first time. The whole of the leg at this time was in a state of mortification, the gastrocnemii muscles detached from their superior attachment, and the back of the knee joint exposed; the fleshy part of the thigh below the fracture was in the same state of mortification, with the exception of a small portion on the inside, which alone connected the dead mass to the living. Above the fracture there was a small extension of mortification, but there appeared no disposition for it to spread higher, and nearly the whole of the parts affected could be included in the incisions for forming the flaps. It was immediately determined to amputate the limb at the hip-joint, which was accomplished as follows:—Mr. Burnard having no assistants excepting his native Doctors, commenced by cutting down on the artery immediately where it emerges, from beneath Poupart's ligament. Having secured this by a single ligature, the knife with one stroke was directed through the connecting part in the inside, by which the operator got rid of the embarrassment of the limb, and then grasping the upper portion of the bone, abducted it as strongly as he could with one hand, while with the other, a catline was carried along it into the joint and round the head of the bone. The dislocation was easily effected, and the attachment of the muscle severed by carrying the knife round close to the bone; and after its removal two flaps were formed by cutting outwards, and inwards from the original incision made to secure the artery, and as far as possible including all the parts affected with sphacelus or threatened with it. Four small arterial branches required ligatures, but the whole hæmorrhage did not exceed three or four ounces, and the flaps were brought together by three sutures, adhesive straps, compress and roller being afterwards applied. The operation and dressing occupied about 20 minutes; the patient bore it with great fortitude, and when returned to his bed appeared but little exhausted. On the evening of the 26th, symptoms of tetanus came on, and pursued the usual course to the destruction of the patient; on the morning of the 28th he expired.—*Trans. of Med. and Phys. Soc. Calcutta, Vol. VI.*

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39. *Stricture of the Rectum treated by the Introduction of a Tent, by a New Process.* By M. Tanchou.—That there exists great analogy between stercoral and urinary fistulæ is not disputed; the following observation is a new proof of the correctness of this opinion. It also shows that the efforts of nature alone, are sometimes adequate to a cure; and that the formation of an artificial anus should be attempted, in all cases of either complete obliteration of the rectum, or of contraction of this gut to such a degree, as to prevent the escape of fæcal matter. It moreover proves, that the occurrence of a fistula, or the performance of this operation, are means by which the days of those affected with stricture of the rectum may at least be prolonged, though they may fail in producing a radical cure.

Case.—*Stricture of the rectum; stercoral fistulæ caused by a gangrene of the breech; one of the fistulæ completely healed; a disposition to a complete cure brought about.*—Madame M. æt. 55, of a strong constitution naturally, and considerable embonpoint, was attacked in 1830 with a violent inflammation of the bowels. She was treated upon the antiphlogistic plan. During convalescence she indulged her appetite too freely, which brought on an attack of indigestion; in consequence of this her restoration to health was slow and imperfect, indeed it seems she never acquired her original sound constitution. In the beginning of 1831 she visited Angoulême, where she delivered herself up entirely to the dictates of her morbid and sensual appetite. In a short time she was seized with a diarrhœa, accompanied by colic and flatulency. This increased to such an extent that she had as many as forty or fifty evacuations during the twenty-four hours; to

this condition of things was soon added a constant tenesmus, which obliged her to remain almost the whole time upon the close-stool. These symptoms gradually abated, without her pursuing in fact, any method of treatment; that is to say the stools were less frequent, and occasionally she was even constipated, though when this was relieved she would be attacked with violent diarrhœa and severe colic. In this condition she set out on her return to Paris, where she arrived after an extremely fatiguing and hazardous journey in the month of April, 1832; I found her very much changed in appearance, she had completely lost her embonpoint, and was very pale. Her abdomen was also considerably swollen, and she suffered from the most violent colics accompanied with a constant desire to visit the close-stool. Her attempts to evacuate were either entirely nugatory, or followed by a discharge of slimy fæcal matter, or of an extremely fœtid fluid. She still refused, as formerly, to submit to any regular treatment, particularly to a rigid course of diet. Her symptoms still increasing in violence, I determined to examine the rectum, in doing which I discovered that the anterior portion of this gut, about three or four inches above the sphincter, had undergone considerable contraction; its posterior face appeared to be as yet in a healthy condition. I insisted anew upon her observance of a rigid diet, and prescribed the application of leeches to the breech, with the design of subduing the inflammation, so that a tent might be introduced; but my orders were but partially obeyed. MM. Roux and Majendie were now called in, both of whom confirmed my diagnosis, and recommended a strict attention to the treatment which I had prescribed. Notwithstanding all this, she persevered in indulging her appetite, and could not, or would not allow the tent to remain in the rectum but a few hours at a time, and occasionally passed whole days together without its being introduced at all. The disease still continued to increase, and the cavity of the gut became smaller and smaller. By degrees she became more and more feeble; emaciation increased rapidly; her complexion became straw-coloured; her abdomen remained swollen, and she evidently suffered from a retention of fæces. Enemata brought away nothing; and finally, the stricture of the rectum increased to such a degree that nothing but liquids could pass through it. She also suffered intensely from colics and tenesmus. Such was the condition of the patient in the month of January, 1833. In the month of June following, (all the above-mentioned symptoms having increased in violence,) there appeared on the right buttock a swelling, which in a short time acquired an immense size. It resembled indeed, very much, both in size and shape, a small wash-hand basin. It imparted to the touch a doughy feel, and was neither inflamed nor very sensible when pressed upon. At this period she had no fæcal evacuations at all. After a time a slight degree of redness was observed upon the surface of the tumour, together with a sensation resembling that produced by the pressure of a thin dough in the cavity of a sac, which indicated either the existence of deep-seated suppuration, or the effusion of a fluid. Positive fluctuation did not exist. The anxiety, fever, and state of desperation under which the patient at this time laboured; but more particularly the supposition that the tumour was formed by a mass of extravasated fæces, induced me to decide upon making an incision into it; accordingly one three inches in length, and corresponding in direction with the apex of the buttock, was made in its summit. This gave issue to a large quantity of very fœtid gas, fæcal matter, and a small quantity of pus; these were not encysted or collected in a mass, but seemed to be merely infiltrated. The patient was relieved, though the swelling was not sensibly diminished. On the third day after the operation, there appeared near the fold of the breech and thigh, a small gangrenous spot, which in a short time increased to such an extent, as almost to touch the incisions. Thinking it the better plan to lay open this mass, I continued the first incision downwards for about three inches. The whole was then lightly dressed, after having been previously washed with chloride of lime water. The discharges from the wound were composed of fæcal matter, mixed with pus, and a gangrenous sanies. In a few days a large portion of the interior of the buttock was attacked with gangrene, and a mass of sphacelated cellular tissue,

nearly equalling in size the two fists, presented itself between the lips of the wound. This was washed in the chlorine solution, and then dusted over with powdered tan-bark and quinine. The edges of the wound were dressed with strips of linen spread with storax. During this treatment, and without doubt by the efforts of nature alone, the gangrene ceased to progress; the margins of the eschar were detached; the inner surface of the buttock sloughed off, and there remained an ulcerated surface more than eight inches in diameter, and deep enough to lodge the doubled fist, which terminated above in a stercoral fistula large enough to allow the ready escape of the fæcal matters. All the symptoms produced by the retention of the fæces now ceased; the sleep became again tranquil; the appetite returned; soups and light articles of diet were easily evacuated; the fever diminished; the wound assumed a healthy appearance; granulations sprouted up from all sides; and on the 15th of August the sore had diminished at least a third; its bottom was nearly on a level with the surface of the skin; and to my great astonishment every thing indicated a speedy restoration to health.

About this time a small tumour made its appearance between the sphincter and coccyx, which soon opened; the orifice however was not sufficiently large to allow the fæces to pass readily; I therefore enlarged it. The quantity of fæces that were evacuated through the fistula, (nothing passed through the anus for two months before this time,) now began to diminish; the abdomen, which had returned nearly to its natural state, again became tense; the complexion, which had regained its clear and rosy tint, became again pallid; the colics were more frequent and violent, and she was at length obliged to keep her bed; in short, all the symptoms dependent upon a retention of fæces reäppeared. I now enlarged the opening in the last tumour an inch and a half, directing the incision along the coccyx, believing that a division of the sphincter would be attended by no beneficial result. This gave issue to a large quantity of fæcal matter and pus, that had collected in this new situation. From this time forward the discharge from the original fistula daily diminished, until at length it ceased entirely, and the wound nearly healed. The injections, which formerly were discharged through several orifices, were now returned through the last incision alone. In a word, the original fistula closed, and the course of the fæces seemed to approach the natural direction. The appetite, spirits, and embonpoint of the patient returned; she is also strong enough to walk in her garden, and every thing leads us to conclude, that although a perfect cure of all her complaints will not be effected, she will at least be left with merely the inconvenience of a stercoral fistula, which will not materially shorten her days. It may even be possible, after the complete cicatrization of the breech, to unite the anus to the remaining fistula, by dividing the barrier which separates the two cavities from each other, provided this barrier is not of too great an extent, and the point of communication between the fistula and cavity of the rectum is attainable with the point of the finger. The patient would then be able, after having suffered from gangrene of the breech, accompanied by several stercoral fistulæ, to evacuate her fæces per vias naturales! The manner in which the tent was introduced into the rectum during the period that Madame M. consented to its application, merits perhaps a particular notice. For the first few days it was introduced in the form of a long conical cylinder, the point of which passed through the anus, in order that this point of the gut might suffer the least degree of pressure. But in a short time the rectum, from the combined influence of the disease, and a thickening of its parietes, becoming changed both in its shape and direction, it was found impossible to follow up its sinuosities except with a stilet. It occurred to me, that by mounting the tent in the following manner, its introduction into the stricture would be materially facilitated. I had made a little tube about an inch in length, the superior extremity of which terminated in a sort of neck; its inferior extremity was conical, and opened for the reception of a forked probe about six inches in length. The tent, (mèche,) supported in its middle by the neck of the tube, was so arranged as to cover the latter completely. In order to apply it, I first introduced a

long flexible probe into the rectum, and searched for the stricture. Having found it, I passed up the tent by shoving it along the probe, which being held in the stricture, and its lower extremity passed through the cavity of the cylinder, served as a conductor to the point diseased. By this means the tent was safely lodged beyond the point of stricture, without the operation being attended by fatigue to the patient, and without any portion of the intestine, except the point strictured, being subjected to any distention whatever. The stilet and conductor were then withdrawn, and the tent left in the stricture. The great advantage of this sort of mèche is, that it permits the escape of flatus which sometimes collects in large quantities in these cases, and which is prevented from passing out by the tents usually made use of, which block up completely the cavity of the stricture.—*Gaz. Méd. de Paris, Sept. 28th*, 1833.

MIDWIFERY.

40. *Malposition of the Spinal column rendering Delivery impossible—Cæsarean section—Death.*—Minot, a female, forty years of age, had been pregnant seven times within the last twelve years. Her fifth and sixth pregnancies terminated in abortion within the first three months. The rest had been all more or less difficult, and only one child had been born alive. The application of the forceps had been necessary in each labour; and at the last M. Capuron had been compelled to turn the child and perforate the base of the skull. On the 3d of February last, being pregnant for the eighth time, M. Bello was called upon to see the woman, whom he found in the eighth month of pregnancy, having suffered for seventy-two hours from pains in the loins, exactly similar to those which preceded her other labours. When the patient was uncovered, M. Bello found the abdomen of the woman hanging down completely between the thighs, and covering the knees in such a manner, that the umbilicus, which formed the most inferior point of the tumour, touched the thighs when the patient was in the sitting posture. The anterior, or, rather, inferior, surface of the skin covering the abdomen, which was enormously distended, presented a very intense purple redness, with some crusts and slight ulcerations. At the lower part, on the left side, was noticed the trace of an old large cicatrix, and a little higher, near the median line, an actual loss of substance, of the size of a franc piece, produced by sloughing of the abdominal parietes. The bottom of the escharous ulcer was formed by a smooth, thin, transparent membrane, which was recognised to be the peritoneum. The termination of the former labours, the state of the abdominal parietes, and the extreme deviation of the uterus from its natural position, did not leave any hope of the next delivery being terminated without the assistance of art; and it was readily agreed by four physicians who were present, that something should be done before the labour-pains had further reduced the strength of the patient. The application of the forceps was impracticable, because every attempt made to return the uterus to its natural position, and bring the fœtus to the inlet of the pelvis, occasioned the most violent pains, whilst version was judged equally impossible, because the toucher could not discover the os uteri, which seemed more elevated than the fundus. Finally, symphyseotomy, which, besides being little applicable to the peculiar case in question, was excluded by the manner in which the abdomen covered the pelvic arch. The Cæsarean operation was therefore, decided on, and performed on the next day, 4th of February, 1833, by M. Baudelocque. A longitudinal incision of five inches in extent was made along the median line of the bottom of the tumour; the first stroke of the bistoury, although carried to the depth of a line, only exposed the uterus, and the operation was finished in sixteen minutes without the patient complaining of the least pain. The infant, extracted alive, was feeble, and imperfectly developed; it lived only for seventeen hours; a very small quantity of blood was lost during the operation, and a fainting fit by which it was succeeded, was attributed to maternal emotion. The patient was replaced in bed, and expired fifteen hours after the operation.

Autopsy eight hours after death.—The face and whole cutaneous surface of the body were remarkably pale; the cavity of the pelvis and a part of the abdomen were filled with clots of blood; the uterus, in a moderate state of contraction, also contained some clots. The dimensions of the pelvis were taken with accuracy. The antero-posterior diameter of the inlet was four inches eight lines; the transverse was four inches nine lines; the oblique diameters were four inches four lines. The outlet of the pelvis was not equally well formed; the antero-posterior diameter had four inches two lines; but the transverse diameter was contracted to two inches nine lines.

The disposition of the vertebral column explained perfectly the difficulties of the labour. From the occiput to the sacrum it was perfectly straight, without curve, and was united to the anterior part of the sacrum at a right angle, in such a way, that when the woman sat down, the base of sustentation was not formed by the sciatic tuberosities, but by the posterior surface of the sacrum; when she walked, the legs were slightly bent, the trunk was forcibly thrown forwards and to the left side, the shoulders and elbows were carried backwards, and the head was in a forced state of extension, and directed upwards, so that her acquaintances used to compare her manner of walking to that of a stag. This disposition of the vertebral column of necessity threw the abdomen forwards and downwards, and cut the plane of the inlet of the pelvis into two parts, the larger of which gave only a diameter of two and a half inches, and it was, in fact, this diameter which the fœtus would have had to traverse during labour.

It does not appear that this species of malformation has been before noticed by authors amongst the causes which may render labour either difficult or impossible. The woman attributed her deformity to a fall which she had at the age of ten years, and to a disease which seemed consequent on it; this affection was in all probability caries of the vertebræ, which had removed the body of one of the lumbar vertebræ, for on examination there were only found four on the anterior surface of the column, though the posterior surface presented five distinct lumbar spinous processes. The patient evidently died of hæmorrhage, the occurrence of which M. Bello accounts for, by saying the incision into the uterus was made at the point corresponding with the insertion of the placenta: hence, he concludes it will be proper under similar circumstances to apply the stethoscope before the operation, in order to discover the insertion of the placenta, which may thus be avoided.—*Trans. Méd. Sept.* 1833.

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41. *New Method for the Division of the Pelvis in cases of Difficult Parturition.*—This operation, which consists in dividing the horizontal branch of the pubis, on both sides, above the obturator foramen, was originally conceived by Aiken, and first performed by Galbiati, a celebrated accoucheur of Naples, in March, 1832. The following detailed account of this operation, which we copy from the *Lancet*, is taken from *Il Filatre-sibezio*, 1833.

G. Negri, of Naples, of good health, and at present of sound constitution, was rachitic to such a degree, that her stature did not exceed two and a half feet: the lower extremities were extremely deformed, and the pelvis was so vitiated, that the promontory of the sacrum approached within an inch and a quarter of the pubis. She had been pregnant twice before this period, and succeeded in bringing on abortion in the early months; but having become pregnant again at the age of thirty, similar attempts to bring on abortion failed, and she entered the hospital, fully convinced of the impossibility of being delivered in the ordinary way. The necessity of an operation was at once visible, and the method of Dr. Galbiati discussed: new trials were made on the dead body, care having been previously taken to inject the arteries of the pelvis. The operation seemed easy of execution; no important parts, vessels, or nerves, were injured, and although the diameters of the pelvis were artificially reduced to those which the pelvis of the patient presented, the hand could be introduced, and a body as long as the head of a child extracted. A numerous consultation of the professors of the school of Naples was now held; the opinions were various; some rejected the proposed operation altogether. Others preferred the

Cæsarean section; but the greater part of the surgeons and accoucheurs present decided in favour of the new method, as soon as the first pains of labour should appear. On the 30th of March, at day-break, the pains came on: they continued increasing to the middle of the day, when the operation would have been performed, but the consent of the patient could not be obtained before six o'clock in the evening, when the uterine pains were rare and feeble. Before proceeding to the operation, M. Galbiati explained to those present, that when the antero-posterior diameter had one inch of extent, it was necessary to divide the pubis on one side only: that it required a still greater contraction of the inlet of the pelvis to render the double section indispensable, and that the case before them was of the first kind. Besides, as the inclination of the promontory of the sacrum to the left gave more space on the right side of the pelvis, it was proper to take advantage of that circumstance, and operate on the right side: finally, as the strength of the woman was not reduced, it would be right to permit the uterus to act for some time longer on the child's head.

The operation was commenced by a longitudinal incision of an inch and a half, which exposed the horizontal branch of the pubis, on the right side, as near as possible to the cotyloid cavity; the periosteum was detached by means of a concave scraper, and the bone divided; the ascending branch of the ischium was divided in the same manner, and the operation terminated by symphyseotomy: the operation lasted an hour and a quarter, but was performed without the occurrence of any accident: the patient did not seem to suffer much, and shortly after its termination the waters came away; the expulsion of the child was now left to nature. Four hours after the operation the patient was put into a warm-bath, during which the uterine contractions became more frequent and powerful: a moderate dose of secale cornutum was administered, but immediately rejected by vomiting. The patient passed a quiet night; in the morning the countenance was nearly natural, the pulse a little disturbed, tongue moist; abdomen free from pain, and uterus contracted upon the fœtus; the pains still remained feeble and rare; the finger could barely touch the head of the fœtus, extremely high in the pelvis. The warm-bath was repeated twice in the course of the day without any effect, the contractions of the uterus remaining in the same state; during the night they were equally feeble. On the second day the face was natural; pulse feverish; tongue red and dry; the belly a little swollen, and slightly painful; the head of the child could be felt more distinctly, but it had not at all descended into the cavity of the pelvis. In this state of things, a new consultation was held, and it was resolved to divide the horizontal branch of the pubis on the left side, and to have recourse either to version or the forceps, as no result could be expected from the feeble condition of the mother. The patient at first refused to consent to this new operation, but agreed to submit at four o'clock in the evening. The operation was performed in the same way as that already described, and the head of the child, which was not at all engaged, was seized with the forceps, and brought down into the cavity of the pelvis, where it was left: the finger ascertained that the cranium had given way; and the parietal bones, which were detached from the rest of the skull, were easily extracted. As the death of the fœtus was now certain, the remainder of the brain was evacuated, and the fœtus easily extracted by the hand; there were two circles of the umbilical cord attached round its neck; the skin was so little altered, as to give rise to the opinion that the child was alive on the evening before. Although the manœuvres necessary for the extraction of the child did not last more than half an hour, and were performed with the utmost delicacy and caution, the patient immediately fell into such a state of prostration, that she seemed on the point of expiring; her countenance was cadaverous, the pulse insensible, and the body covered with a cold sweat. The means proper to revive and support her were immediately employed, and she passed a pretty tranquil night; in the morning the tongue was red and dry, and the pulse had rallied a little, but the abdomen was painful and tympanitic; a very fetid sanies was discharged from the vagina, and the patient expired during the night.

Autopsy.—The external genital organs were livid, and the wounds gangrenous: the anterior portion of the vagina was healthy, but the posterior wall was completely gangrenous and sphacelated in the portion corresponding with the symphysis of the pubis; the cellular tissue surrounding the anterior part of the pelvis was infiltrated, and the divided bones were altered in their colour as in necrosis; the section of the bone was clearly made on the right side, but on the left the bone seemed rather fractured, and broken into scales. The symphysis of the pubis was not divided, but the bone had been cut a little to the right side. The peritoneum and abdominal viscera were perfectly healthy. The uterus, which was contracted, was healthy on its external surface, but internally livid; the sacro-iliac symphysis had not been injured.

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42. *Cæsarean Operation.*—A case of this was communicated to Dr. Wise, by Dr. Leotard of Chandernagore, who assisted Dr. Tasse at the operation. The patient, aged twenty years, had a deformity of the pelvis, and after being in labour for four days, submitted to the Cæsarean operation, which was performed in the usual manner, and the dead child and placenta were removed; a bandage was then applied round the body, and the wound was left without any dressing for several hours, after which the edges of the incision were secured by the interrupted suture and adhesive plaster. The wound was healed in forty days.—*Transactions of the Medical and Physical Society of Calcutta, Vol. VI.*

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43. *The Advantages of Turning the Fœtus by the Head rather than by the Feet.*—Up to the end of the 16th century, the only mode of turning ever practised was by bringing down the head first; and we find this conduct recommended, not only in such cases as are admitted at the present day to require artificial delivery, but even in common pelvic and feet presentations. Soon after the above-mentioned date, turning by the feet was first proposed, but it was not until the commencement of the 18th century that the practice was generally followed. One of the professors of the School of Strasburg resisted this innovation, strongly maintaining the superiority of the old regime; and his advice was approved of by many of the German practitioners. To justify this preference it was asserted that when the head presented first, the compression caused by the os uteri is not sufficient to injure the encephalic contents, and moreover, the communicant circulation between mother and child remains unobstructed; whereas in presentations of the lower extremities, the thoracic and abdominal viscera are exposed to a dangerous compression, and the fluids are driven back upon the head, thus causing frequently a fatal cerebral congestion. In confirmation of the truth of this statement, we are told that only one child in twenty delivered by the head is still-born; whereas, the proportion is one to five in feet presentations. In conclusion, it is alleged that whenever the fœtus is moveable within the uterus, it is quite as easy to effect the turning by the head as by the feet.

M. Dubois dissented from the above arguments. He contended that the described dangers of any compression on the abdomen and thorax were most unnecessarily exaggerated, and instanced two cases wherein the shoulder presented along with the head, and yet the children were delivered without any contusion of the thoracic and of the abdominal viscera.

The dread too of the retropulsion of the blood upon the head was an offspring of fancy rather than a result of experience, he did not agree with them in their belief that the os uteri exercised such a constrictive pressure as was alleged; the parts of the fœtus which have already escaped from the uterus are subjected to a less degree of pressure than those still contained within its cavity; and hence we can readily explain why the blood should be driven to and accumulated in the former. Do we not observe that when an arm is born first, the member frequently becomes much swollen? now this swelling arises from the pressure being less upon the arm than upon the rest of the body. True it may be, that in many children who die after feet presentation, visceral congestions are not unfrequently discovered; but the cause of these is the compression of

the umbilical cord, and not the retropulsion of the fluids which M. Flamant believed to take place.

The compression of the cord is a necessary danger attending all births by the feet, and indeed it constitutes a very serious objection to the process of turning; the child is very often asphyxiated, and in such a case we find upon dissection the same phenomena which are observed after drowning or hanging, viz. an apoplectic plethora within the head, great congestion in the veins of the cerebrum and other viscera.

The calculations which have been adduced to prove the greater safety of turning by the head than by the feet, are not strictly correct, as will appear from the following statement of M. Dubois.

In all such calculations, to ascertain the comparative mortality of the different modes of delivery, we must be careful to exclude from our tables all cases wherein the child has died before actual accouchement has commenced; or wherein the labour has been premature, and the child may be therefore not well capable of independent life. Now the new tables which have been recently formed at the Maternité of Paris, on these principles, shew, that from the 1st of June, 1829, to the 1st of June, 1833, 10724 children have been born at the hospital; of these 10262 were born by the head, 391 by the lower extremity, 59 by the trunk, and—30 by the face; of the 10262, 9867 were at the full period of gestation, and 395 were not. The 9867 may be reduced to 9837, because, in 30 of the cases the fœtus was known to be dead before delivery commenced, and the 395 premature cases may be reduced to 278; for in 83 the fœtus had been dead for some time, and in 34 it was too imperfectly developed for the maintenance of independent life.

Of the 9837 deliveries by the head at the full time, 191 were born dead; the proportion is therefore one in 51 or 52; and of the 278 prematurely born, 48 were born dead, or one in every 5 or 6. Of the 391 deliveries by the lower extremity 238 were at the full term, and 153 before the term; from the first number we must deduct 7, who were dead before labour began; and out of the remaining 231, 21 were born dead; a proportion of one to eleven. From the 153 we must deduct 63, in which the child had evidently died during pregnancy, and 30, in which it was too young for independent life; and out of the remaining 60, 10 were born dead; or one in six. From these calculations it appears among other results, that the fœtus at the full period can endure the "*fatigues of accouchement*" with much greater safety than when born at an earlier period, whether they are delivered by the head or not. M. Dubois draws our attention to the important difference in the results by the previous deduction of all the cases in which the fœtus either had been dead for some time before labour, or was incapable of life when delivered. Thus had we enumerated these cases among the mortality in the 10262 head presentations, we should have had 386 deaths, or one in 25; whereas we have fixed it above at one in 51: and in the 391 feet presentations the deaths would have amounted to 134, or nearly one in two instead of one in eleven. With regard to the comparative advantages in practice of turning by the head, M. D. admits that in some cases the operation is not only quite possible, [Mad. Lachapelle was wrong in denying this,] but also abundantly easy. He has himself performed it twice when the shoulder presented; but the operation is much more difficult than that of turning by the feet, and should the liquor amnii have copiously escaped, or should the uterus be firmly contracted around the child, the manœuvre is almost impracticable. In the 59 trunk presentations, two were delivered by means of turning by the head; in a third case the expulsion of a putrid fœtus took place by the shoulder; and in the remaining 56 the child was brought down by the feet. Out of the whole number 59, in 25 only did the child survive; but M. Dubois is of opinion that a still smaller number would have been saved had turning by the head been tried in all.—*Med. Chirurg. Rev. January*, 1834.

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44. *Luxation of the Pubis during Delivery.*—A robust female, twenty-three years of age, pregnant with her first child, had a very difficult labour, the child

died during delivery. The last pain was so violent that the woman was convulsively raised from her bed. Nine days after her delivery, Dr. RIEKE was called to the patient, and found on examination a luxation of the pubis; the symphysis was broken, and the left side carried half an inch at least behind the right. The external genital parts and vagina, were much tumefied, nevertheless the urine and lochia flowed freely. The patient complained of pain in the region of the symphysis, and she could not walk. The patient having been placed on her back, Dr. Rieke applied his hands upon the crista ilea, and pushing backwards, endeavoured to separate them as far as possible, in order to restore the pubis to its natural situation; but he could not apply this force long in consequence of the violent pain it occasioned to the patient. Nevertheless, after several trials, this succeeded on the second day, whilst the patient held her legs flexed upon her thighs. From the moment that the luxation was reduced the patient could walk. To relieve the unsteady walking, and close the articulation, the patient was directed to wear for some time a bandage similar to a truss. On examination, it was found that the descending branches of the pubis formed an acute angle which contracted the inferior straight.—*Heidelberger Klinische Annalen*, B. vii. S. 3. 1831.

CHEMISTRY.

45. *New Method of Preparing Medicinal Prussic Acid.*—RICHARD LAMING, Esq. recommends the following formula for the preparation of medicinal prussic acid by the extemporaneous decomposition of cyanuret of potassium:—Take of Cyanuret of potassium, 22 grains; Tartaric acid crystals, 50 grains; Distilled water, 6 fluid drachms; Rectified spirit, 3 fluid drachms; in a phial capable of containing eleven or twelve fluid drachms. Dissolve the tartaric acid in the water and the spirit, previously mixed together, and suffered to become quite cold; then add the cyanuret of potassium, and immediately close the phial with a sound cork. After occasional agitation during ten minutes, secure the cork and set the phial aside, for the supertartrate of potass to precipitate—when the clear solution may be decanted for use.

The medicinal solution thus made, Mr. Laming states, is "always of the same strength; nor is it an insignificant recommendation, its being much less liable to spontaneous decomposition than the sorts made in any other way.

"There has been an impediment in the adoption of such a formula, in the delicacy of the cyanuret of potassium; no plan heretofore having been discovered for its formation in a state of purity. The few specimens of this salt which I have been able to collect, have all exhibited a variety of hues, depending on particular contaminations; and in some instances they were found to contain large quantities of carbonic acid. The prussic acid made with them was usually, in consequence, of a deep yellow colour; but at times it was obtained green, and brown, and blue.

"The accompanying cyanuret of potassium is pure, and I believe the first specimen ever obtained in a state of purity. By analysis I have found its composition to be—

Cyanogen - -	3.25 × 8 =	26
Potassium - -	5 × 8 =	40
	8.25	66.0

and that of anhydrous prussic acid being

Cyanogen - -	3.25 × 8 =	26
Hydrogen - -	.125 × 8 =	1
	3.375	27.0

"We have, of course, in every 66 grs. of cyanuret, an equivalent for 27 grains of absolute acid; and this number being allotted, in the new formula, to 27

drachms of liquid, every 60 minims of the medicinal prussic acid will contain precisely one grain of the strong medicine. The relative strengths afforded by the known formulas stand thus:—

		Number of Grains of absolute Prussic Acid in 60 Minims of Medicinal Solution.	
Plan by	Formula by	Real.	Estimated.
Scheele.	Scheele.	1½	8
Pharm. Dublin.	Pharm. Dublin.	1 or 1¼	1½
Gea Pessina.	Henri.	unknown.	20
Proust. (both ascribed to Vauquelin.)	Pharm. Gallica.	1 or about.	1½
Vauquelin & Gay Lussac.	Magendie.	7	7
	Robiquet.	20	20
New Plan.	New Formula.	1	1

"This table will explain the reason why one grain in a fluid drachm has been adopted for the new formula: in the first place, it is about the strength which experimentally results from the only process at present sanctioned by either of the British Pharmacopœias; it is also near to that of the medicinal acid usually called Vauquelin's; and from Scheele's it differs by about half a grain, on that side which will be a guarantee against a careless dispenser of prescriptions doing mischief, should he mistake the newly-introduced medicine for his. In addition to this, it has been thought to afford facilities for the correct estimation of a dose."—*Lond. Med. Gaz. Sept.* 1833.

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45. *Test for Hydrocyanic Acid, and Method of appreciating the Quantity.*—We are informed by Mr. John T. Barry, that the nitrate of silver, in common with other salts of that metal, is so extremely delicate a test of the presence of hydrocyanic acid, that its detection is not difficult in a drop of water containing far less than *the ten thousandth part of a grain* of that poisonous agent. For instance, if one minim of the dilute medicinal solution be mixed with a pint of water, its presence may be demonstrated in a single drop of the mixture. But what is of more consequence is, that although the mixture be contaminated with various organic substances, such as those contained in articles of diet, milk, coffee, tea, porter, wine and soups, so far as is yet known the test retains its sensibility unimpaired. Mr. Barry, however, thinks that this extreme sensibility, while it renders the evidence of the silver test conclusive as to the *absence* of prussic acid, will be of more limited service in establishing its *presence*, for, without adverting to the possibility of other volatile substances being hereafter discovered to have a similar effect on solution of silver, it is to be borne in mind that this reägent indicates the existence of prussic acid in some esculent substances where it had previously been found, as well as in some new ones. Upon this branch of the subject medical jurists will probably think it right to collect information.

The application of the solution of silver is simple. The suspected fluid is to be acidulated by the addition of acetic acid, but so as to redden litmus paper

in only the *slightest degree*. If excess of acid be already present, it is to be *not quite* neutralized by carbonate of soda. These precautions are adopted to retard the interference of ammonia or muriatic acid. Two or three drops, quite cold, are then put into a watch glass, and immediately covered by a plate of glass, whose under surface, to the breadth of a pea, is moistened with solution of nitrate of silver, formed by dissolving one grain lunar caustic in 100 grains distilled water:—

If the inverted drop of silver solution retain its transparency unaltered, the *absence* of prussic acid is established; for had it been present, the silver solution would in a few moments have become clouded by the formation of a *white* precipitate, an effect which, indeed, is almost instantaneous when the prussic acid is not excessively diluted. If, on the other hand, the precipitate appear, the conclusion must not be drawn, that it is *cyanuret* of silver, until identified as such by two properties:—first, its speedy *re-solubility*, as denoted by the clouded drop becoming again clear, when *placed over* a vessel of caustic ammonia, in which respect it differs from the silver compounds of iodine and bromime:—and secondly, in retaining *unchanged* its pure white colour after exposure a few minutes to the sun's rays, or for a longer time to day-light. As this property essentially distinguishes it from the compound of silver with chlorine, it is important to establish it by a separate experiment upon a somewhat larger portion of the precipitate, which should be obtained by candle-light, by successively placing the inverted drop of nitrate of silver over renewed portions of the liquid in a saucer, as soon as the precipitate separates into distinct curd-like particles, it is ready for exposure to the solar rays.

Another property which distinguishes the cyanide, (or cyanuret,) of silver from the chloride, is, that upon being ignited in an open short glass tube, the cyanogen burns with a flame of the usual colour, leaving the metal pure, if sufficiently heated,—a quality the more valuable as it furnishes an index to the *proportion* of prussic acid it represents, which upon ordinary occasions may be estimated as equal to one-fourth the weight of residual silver.

When, acting upon this principle, it is desirable to ascertain the *entire* quantity of prussic acid, it is to be obtained by slowly distilling over, in nearly filled close vessels, about an eighth of the acidulated mixture under examination; rectifying it; reäcidulating by acetic acid; precipitating by *slight* excess of nitrate silver; washing with distilled water, only so long as the washings affect litmus paper; drying at 212°; weighing:—and lastly, igniting and re-weighing.

The medicinal solution above referred to, (as to be diluted for experiment in the proportion of one drop to the pint of water,) contains, in round numbers, nearly a sixteenth of its own weight of anhydrous prussic acid, or rather less than four grains in the drachm, being the article, (commonly designated "of Scheele's strength,") as manufactured by some respectable houses in London. We understand that Messrs. William Allen and Co., by means of silver as a reägent, have uniformly concentrated it to this degree since the year 1820, when Mr. Barry introduced the use of that metal to determine and regulate its proportion of absolute prussic acid by the formation of cyanuret of silver. The method being one which admits of extreme precision, will deserve the attention of the College of Physicians, if prussic acid be inserted in the next Pharmacopœia. It is to be recollected that this preparation, like those of alcohol or æther, is subject to variation, notwithstanding any superiority of formula, or care on the part of the operator. Hence the necessity of means for assaying the final product and for reducing it to a uniform standard. With regard to the employment of cyanuret of potassium for the occasional formation of hydrocyanic acid, it is a question which at least deserves very serious consideration. Its disposition to absorb atmospheric moisture, and always to become more or less converted into carbonate, while its cyanogen, (united to hydrogen,) to an uncertain extent is dissipated, especially when this beautiful salt is much disintegrated, constitute formidable difficulties. But a still greater objection will present itself at the counters of apothecaries and chemists where medicines are

made up, from the possibility of this intensely poisonous salt being sometimes mistaken for other substances, in the frequent extemporaneous production of prussic acid.—*The London and Edinburgh Philos. Mag. &c. February*, 1834.

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47. *On Cusparia from Angustura Bark.*—M. SALADIN obtains *cusparia* from angustura bark by the following process: Digest seven parts of the bark in 20 parts of alcohol, of sp. gr. 0.795, without heat: let the spirit evaporate gradually at a very low temperature. After some days have elapsed, there will be observed very slight mammellated crystalline appearances, in a magma of colouring and extractive matter, &c. &c., and also deposited as acetates upon the upper part of the sides of the vessel. When carefully separated from the liquor, pressed and freed by a small quantity of water from the greater part of the foreign substances mixed with it, the crystalline form appears regular, though not very distinct.

By fresh treatment with alcohol, of sp. gr. 0.8349, and successive agitation with a little hydrate of lead freshly precipitated and æther, it separates, though with difficulty, from the fatty and colouring matters with which it is mixed; and it presents, even after some hours' exposure to a freezing mixture, acidulous crystals, united in concentric groups, the greater part of which are tetrahedrons and various modifications of this form.

These crystals dissolve in alcohol, and more rapidly when moist than after drying; the solution is bitter and slightly acrid: it does not act either as an acid or as a base. It dissolves readily in acids, and forms during their concentration, especially in acetic and muriatic acids, a white flaky deposit, which retains acid strongly even after a number of washings: it appears, however, to be merely a hydrate of cusparia.

It is insoluble in the volatile oils and æther, but dissolves in small quantity in water, according to its temperature: 1000 parts of water, at 55° Fahr., dissolve 5.45 parts; at 212°, 11.04 parts. Alcohol of 0.8356 at 60° dissolves 37–100dths of its weight.

Nitric and fluoric acid at common temperatures renders cusparia yellowish green; sulphuric acid turns it reddish brown: neither iodic nor muriatic acid produces any visible alteration: the salts and the protoxides of iron and tin, the acetate and subacetate of lead do not precipitate its solutions. These characters are sufficient to distinguish it from brucia; like brucia and salicine, however, it possesses the property of being reddened by pernitrate of mercury.—This test will serve to detect the smallest admixture of salicine with sulphate of quina, even 1–743dth.

Tincture of galls precipitates cusparia abundantly both from water and alcohol: the alkalies dissolve it partially without altering it. Chlorine, iodine and bromine in the gaseous state colour it; the first of a straw yellow, and the two last brown. In the first case, the cusparia becomes more soluble in the state of a peculiar acid; the washings contained only traces of chlorine.

When heated to 130° Fahr. and gradually higher, cusparia first melts, and then loses 23.09 per cent. of its weight. It does not appear to suffer any alteration until it is heated to about 270° Fahr.; it then burns, without leaving any appreciable residue, and without subliming or phosphorescing: its vapour at a lower degree does not indicate azote as one of its elements; and by this it is also distinguished from brucia. The only circumstances which require notice in the angustura bark are, that it contains rather a large quantity of pectine and no copper.

Cusparia is not poisonous, even in large doses; its properties appear to approach those of quina, gentianine and salicine. When the watery and acid extract of the bark is treated with animal charcoal, alcohol, &c., there may be obtained by crystallization about 13-1000dths of the weight of the bark employed.—*Ibid, et Journ. de Chim. Méd. July*, 1833.

AMERICAN INTELLIGENCE.

Case of Adhesion of the Placenta to the Fundus of the Uterus, successfully treated by Ergot. By Edward Worrell, M. D. Assistant Surgeon U. S. Army. [Communicated in a letter to the Editor.]—Sir—In your very valuable Journal I find many cases recorded of the effects of the Secale cornutum, or ergot, and as the following is one of rare occurrence and some practical importance, I take the liberty of forwarding it for your disposal.

Case.—I was called to visit a black girl who, I was informed, was in labour, but on arriving at the house was told "she had been delivered of her child *three days before*, but that the after-birth was still retained." I found her with a countenance expressing much anxiety; severe pain in the region of the uterus; a hot, dry skin; and her pulse about 120 in a minute and very small. On raising the bed-clothes to introduce my hand for examination, there escaped the most disgusting stench I ever encountered. I then introduced my finger into the vagina, upon which she sprung to the head of the bed, exclaiming, "Oh, you will kill me." I immediately withdrew my hand, and asked what was the matter? She then told me "that the nurse had felt her so much that she could not bear to be touched." I explained the necessity which existed for an examination, and that it was impossible for me to render her any assistance unless she submitted. She then told me she would bear it. I again introduced my finger, and carried it to the os uteri along the cord, which I found so firmly contracted that I could scarcely introduce the end of my finger, and its edges quite firm, and yielding none to the pressure made upon it. I then held the finger of the right hand at the os uteri, and drew gently, with the left hand, the umbilical cord in order to ascertain where the adhesion existed by the course of the cord. This I found to be at the fundus, and that very firmly. The case to me was a novel one. I never had seen or read of a case having occurred, and the only light thrown upon the subject is a paragraph in Dewees' System of Midwifery, where he says that he has never seen a case of adhesion of the placenta to the fundus of the uterus, and at the same time a contraction of the os uteri, but that *he would suppose* the Secale cornutum might be advantageously used. We know the powerful effects of this remedy on the fibres of the uterus—we know that it produces strong contractions—then the question arises, will the contraction of the longitudinal fibres overcome the force of the circular? if so, the os uteri must dilate—I believed it would, and consequently gave fifteen grains of the ergot as a dose. Its effects were powerful, and continued some time, but without producing any other effect. In half an hour I repeated the dose with the same result as the first, except that the contractions of the uterus were stronger. I repeated the third, fourth, and fifth time, with an interval of half an hour between each dose. Immediately after giving the fifth dose, making in all seventy-five grains, I had the pleasure to find the os uteri open, the adhesion give way, and the placenta delivered. The girl did well with the exception of a mild phlegmasia dolens, which yielded to simple remedies.

Fort Howard, Green Bay, Michigan Territory, December 28th, 1833.

On the Climate of Florida. By H. Perrine, M. D.—I have just received the 25th No. of your Journal for November, 1833. Among the subjects most interesting to me, is the article under "American Intelligence," headed "St. Augustine, *East* Florida, as a Resort for Invalids." Dr. Bell has rendered a great service to truth and humanity in showing the variability of its climate. It is true, that it is not so variable as the south of France or Italy; that it is preferable to that of Charleston or New Orleans, but it does not still approximate to that of the torrid zone. In Campeche the lowest temperature in seven years has been 62°, and the highest 98°. Recollect that one occurred on the coldest night, or rather break of day in the coldest winter, and that the other was noted at the hottest, 1 o'clock in the afternoon of the hottest

summer. The upper part of Florida, or that within the range of the miscalled temperate, but really variable zone, has been politically divided into Eastern, Middle, and Western Florida. By far the most important portion of that Peninsula is unsurveyed, unsold, unpopulated, and consequently unknown. I am willing to let the eastern and middle sections of the upper division extend down to 28°, but all below I claim the right to baptise under the name of Southern or Tropical Florida. In my address to the "Intelligent Friends of the Union," published in October, 1832, I first called the attention of the public to the fact, that the climate of the tropics extends beyond its astronomical boundary several degrees north into this most interesting portion of our territory. Nature does not confine herself within the artificial lines of astronomers. It has long been known that degrees of latitude do not indicate degrees of temperature, and that still less dependence can be placed upon them in the western than in the eastern hemisphere. In America the temperate and the torrid zone of the books encroach upon each other, and an intermediate division might more naturally be traced under the title of the *tropicoid* zone. Why the term temperate should continue to be applied to the region of variable climates, is more easily explained than excused. It is however certain, that the epithet is more applicable to the uniform temperature of those districts included under the names of hot or tropical climates, or still more erroneously of the torrid zone. The facts are, that extreme heat is greater at the pole than at the equator, and that it does not depend on the distance or position of the sun, but on the time it remains above the horizon. It is nearer to us in winter than in summer; approximates to a perpendicular position more at noon than in the hotter hours afterwards; raises still nearer to our zenith in the pleasant month of June than in our scorching July or August, and then elevates the thermometer higher in Boston than in New Orleans. In using the possessive *our*, I of course speak of our broad and happy home, the United States. Were the surface of the globe a uniform level of land or water, the rule would be universal, that heat and cold exactly correspond with light and darkness. When the length of the day and of the night were equal, so would be the heat of the one and the cold of the other over all the earth. The heat accumulated during twelve hours of light, would be lost during twelve hours of darkness. Under actual formation the law is general, that the nearer we approach to the poles, the hotter is the hottest day of summer, and the colder is the coldest day of winter, and the nearer to the equator, vice versa. But strike out every thing theoretical in the foregoing lines, and let us return to the facts relative to the climate of the Peninsula of Florida. It will no doubt appear strange, that within a hundred and fifty miles of St. Augustine, we will not merely find a much greater uniformity of temperature, but also all the phenomena of a tropical climate; yet it is not less strange than true.

The other general characteristics of the tropics are a warm dry winter, a wet refreshing summer, a cooling breeze from the sea by day, a cooling breeze from the land by night, and a westwardly current of the atmosphere, as well as of the waters commonly called the trade wind. The great equatorial current of rotation to the west, is in the Newtonian philosophy, attributed to solar attraction, but like the tides, would doubtless occur if both sun and moon were stricken from the universe. Without going beyond the earth, its combined diurnal and annual motions are sufficient to account for the movements of the liquid and aerial fluids upon its surface: whatever be the theory adopted, we should à priori, infer that the westward winds and waves should be both stronger and steadier in proportion to their proximity to the equator. But the equatorial current of water, which, in the wide Pacific Ocean acquired sufficient strength to cut off New Holland from Asia, required so little force in its voyage across the Indian Ocean, that unable to cross tropical Africa, or even to wind round its northern border through the Red Sea, it was content to wear its way round southern Africa, scooping out its eastern shores up to the equatorial belt of the Atlantic Ocean. Reäccumulating strength in its natural route, it made a desperate attempt to force a passage through equatorial America, but became so

exhausted after reaching the Isthmus of Panama, that it suffered itself to be reflected northward between the West India Islands, which it had separated from the main land, and makes its hot appearance on our coasts under the name of the Gulf Stream, cooling, weakening, and widening on its sultry journey back to the eastern hemisphere. The equatorial current of air is as little conformable to the rules of general philosophy. It should be very strong and very steady at the equator, but it is neither strong nor steady nor directly westward there, nor within several degrees either north or south of that line. On the contrary, the wind is more strongly and steadily from the east in the latitudes of tropical Florida than within any portion of the torrid zone. For a confirmation of these facts, you can refer to a paper by Basil Hall, published in the American Almanac or Repository of Useful Knowledge for 1832. However incorrect may be the observations of this naval captain on land, we have no reason to question his testimony relative to the winds, which have carried him over the sea in every part of the world. The sea and land breeze of the tropics are also liable to accidents not foreseen in the books. In some districts, and at some seasons, the sea breeze will last all night, and the land breeze will endure all day. According to the position of the coast, they may combine with, be modified by, or entirely opposed to the trade wind; there may be no sea nor land breeze at all. The width or the elevation of the land, of course, influence these phenomena. In Yucatan the sea breeze rarely extends thirty miles in the interior. In the hottest dry months from February to June, the land breeze becomes what is here called warm south-easters, and endures sixteen, eighteen, or twenty-four hours; but the sea breeze compensates in force what it has lost in time. On the eastern coast the trade wind aids the sea and opposes the land wind, but as the peninsula is so very broad, it is cooled sufficiently in the night to overcome the impulse of the trade. Were there mountains in the centre of the peninsula, they would not merely oppose a mechanical resistance to the westwardly wind, but would vary still more the temperature of the atmosphere.

Returning to tropical Florida, it will be perceived that it enjoys a combination of advantages for uniformity of temperature that can rarely be equalled in the torrid zone itself. Its surface is narrow. It cannot hence accumulate much heat by night, or lose much heat by day compared with the temperature of the adjoining oceans. Its surface is level, and cannot hence experience those variations of temperature which are produced by hills or mountains.

It stretches to the south, and hence the trade wind passes at right angles across it. Even its inclination to the east is advantageous, a north wind will have to pass over a portion of the sea before touching it. A complete north west wind must also cross a part of the Mexican sea to reach the south western extremity of the peninsula. But above all it has a peculiar regulator of its temperature, hugging its eastern shore, and inclining a little to the west of north. The Gulf Stream freighted with the heat of the torrid zone rushes out between Yucatan and Cuba, runs to the east between Cuba and Florida, and sweeps round to the north between Florida and the Bahamas at the rate of five miles an hour, and with a steady temperature of eighty-five degrees. The steady trade wind crosses this steady hot river, imbibes its steady temperature, and steadily distributes it over the narrow and level surface of tropical Florida. I would not, however, have you infer, that southern Florida is a mere marsh, or a dead level, ready to be overflown by the ocean. On the contrary, the only marshes level it can have, must be the summit level of the whole peninsula. The passage of the Gulf Stream to the north is alone an evidence of the superior elevation of the southern extremity, which is placed beyond a doubt by the river St. John's, taking its rise there, and after meandering several hundred miles to the north, finding an outlet into the sea beyond St. Augustine. The streams then which rise in the same summit level, and discharge directly in the western southern or eastern shore, must have a rapid descent in their channels favourable for mechanical power, or what is still more important in the dry warm winter of tropical climates for irrigation. Be that as it may, we have testimony of the healthiness of Cape Florida in its most unequivocal form. The family of J. Dubose,

consisting of eleven whites, and several negroes, has not had a case of sickness during the last seven years. The tenderest and most productive vegetables of the tropics are flourishing under his care, viz. the benana plant, and the cocoa palm, which are universally admitted to be the greatest blessings of God to man. The harbour at the cape is the first below St. Augustine, and is easily accessible, and a voyage to and from the northern states can be made with less risk and in less time. Admitting then that in southern Florida we have combined a warm dry winter, a cool refreshing summer, a breeze from the sea by day, and from the land by night, a perpetual westward wind, and uniformity of temperature even superior to the West Indies, humanity requires that it should be made an available resort for invalids as soon as possible. Our mineral springs are in general surrounded with all the conveniences and comforts of elegant life, although it was more costly and troublesome to collect them there than it will be at Cape Florida. An association might readily be formed with a capital of a hundred thousand dollars, which would furnish the buildings, gardens, and other conveniences requisite for the most squeamish visitor, and keep a packet running every month with passengers and effects to and from the north. The most luxurious accommodations could be profitably afforded at half the price paid in Havana. There is no necessity for detailing the disadvantages attending a sick American on the island of Cuba, which is the next nearest tropical territory. A part from the difference in language, laws, and customs, it is sufficient to name the horrible prejudice against consumptive patients, as the people are firmly persuaded that every disease with a cough is contagious. In Campeche so strong is the prejudice that the clothes of the patient is burnt, and the walls and floors of the rooms cleansed and white-washed.

Were it not for the disagreeable peculiarities of all Spanish countries I should long since have recommended Campeche as a winter resort to our consumptive patients. The cities inhabited by that race alone, are entirely divested of houses for accommodation to strangers. With a population of at least 20,000 inhabitants, there is not a single establishment entitled to the name of hotel, and the only two apologies for transient visitors are miserable dirty places, not fit for a sailor's boarding house in the north, one of which is kept by a French negro woman, and the other by an Italian sailor. Luckily the fine temperature of the climate enables one to dispense with bed and bedding, and a hammock slung up under a shed or any shelter from the dew is sufficient to pass the night. I am now *sitting* in one at 3 A. M. with the thermometer at 74°, which has not varied three degrees in the last three days and nights, while I observe in Dr. Bell's register that at St. Augustine during the same period there was a difference of 22° in the temperature of the days alone. With my self registering thermometer I have commenced noting the extremes of the present month of February, which I hope will arrive in time for your May No.

Consulate of the United States of America, Campeche, February 3d, 1834.

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Sequel of Dr. Hulse's Case of Ununited Fracture of the Os Humeri, treated by the Injection of a Stimulating Fluid into the Wound.—Dr. Hulse, in a letter, dated U. S. Hospital, Pensacola, March 17th, 1834, informs us that Isaac Harding, the seaman, whose case is related in our last Number, p. 374, has been discharged from Hospital, and has returned to his duty.

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Remarkable Location of Parturient Pains. By Chandler Robbins, M. D.—The lady who was the subject of this case usually enjoys good health. With the exception of occasional head-aches, she has seldom been ill, except at the periods of her confinement. She has had three children, at the birth of all which I have assisted her. The eldest is about seven years old, and the youngest about as many months. Her labours have been severe, and lasted from six to ten hours; but in no period of either have the pains been referred to the back or the groin, or the uterine region. They have all been confined to the muscle around, and particularly in front of the *femur*. They have been most severe about midway between the upper and lower extremity of this bone. Here she has solicited pressure, and here, at the commencement of each pain, her own hand has been

involuntarily placed. In every other character but their *location*, the pains have been such as we always find them; but to this location they have been confined—no sensation of pain having been at any time referred to the vicinity of the uterus.

This case may stand on record as undeniable. The lady is altogether above deception or pretence. Her moral sense is of the highest order; and being accustomed to the most refined society she would shrink from, rather than court, any notoriety on a subject of this nature.

It may not be amiss to add that the after-pains have also been confined to the same region. Dr. Dewees remarks in an article on after-pains, in that excellent compend, Dr. Hays's Cyclopedia, that he once knew after-pains located in the knee; and once, in the jaw.—*Boston Med. and Surg. Journ. March 10th*, 1834.

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Notes of a case of Fistulous opening of the Stomach, successfully treated by Dr. J. H. Cook.—Some time in the month of February, 1832, Dr. Bardwell and myself were called to visit the widow D., aged thirty-nine years. We found her, as near as may be, in the following condition: A fistulous opening, immediately by the side of the umbilicus, into which a buck-shot might have been readily passed; on removing the bandage, a gill of bile was suddenly discharged; after which, a small quantity of a different (the gastric?) fluid, came slowly away. These discharges were attended with great pain, on account of their acrid quality. The whole surface of the abdomen was excoriated, inflamed and intolerably painful. We introduced a flexible catheter, its whole length, thirteen inches, before meeting with any resistance, when the extremity suddenly met with an obstacle. By pushing it against the resisting body, or even by slightly agitating the instrument, strong efforts to vomit were produced.

Withdrawing the catheter, we desired her to drink a glass of water; she did so, and in twenty seconds, the *whole* was discharged through the fistula, as we ascertained, by measuring it. The direction of the fistula was upward, and slightly inclining backwards, with about the same inclination to the right side. We came to the conclusion, that the opening within, was at, or about, the pyloric orifice of the stomach; and that the catheter entered the stomach, and pressed against its cardial portion. The patient even felt it there, and applied her hand externally over that part.

Treatment.—Taking a large beef's bladder, we cut it open, longitudinally, spread it well with adhesive plaster, and after washing the inflamed surface, and dressing it with basilicon spread on fine linen, we applied the bladder over the abdomen, and made an opening over the fistula, through which the matter might escape. We then applied a bandage and compress, and directed that it should be reäpplied immediately after each discharge. We advised mucilaginous drinks, and a diet of rye-mush and molasses, and nourishing enemata. The patient was much emaciated for want of proper nourishment, as every thing passed off undigested through the fistula. No evacuation had taken place in the natural way, for ten days previous to our visit. The external irritation of the abdomen soon healed, and the bladder was then applied to the skin as a protection, and continued there with the happiest effect. The bandage was gradually tightened, and a compress of a cylindrical form was laid over the course of the fistulous canal. By these means our patient regularly, but slowly recovered. In a few days the alvine evacuations were restored to their natural outlet, and the discharges from the fistula began to decrease. In thirty days the opening was closed, and the fistula apparently obliterated. Several months have elapsed since that event, and she continues in excellent health.

All we could collect from her as to the history of her case, was this: Six months before, in one of the south-east counties of this State, she was attacked with constipation and violent pain at the pit of the stomach, which resisted every remedy, till the 19th day, when the fistula showed itself.—*Western Journ. of Med. and Phys. Sciences, January*, 1834.

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Observations on the Pathology of Fever. By John P. Harrison, M. D.—Were we not well acquainted with the author of these observations, who we know to be an ardent votary of his profession, though rather distinguished for brilliancy of

imagination, than for talents for patient and careful investigation, we should hardly have suspected him of having indited this extraordinary rapsody in sober earnestness. The want of precision and accuracy which usually distinguish the attacks upon the physiological doctrine eminently characterize the present one. Dr. Harrison makes sad confusion in the doctrines of the day. He appears to suppose that all the practitioners in France are Broussaisans! What will the Pinelians, the Pathological Anatomists, the Eclectics, &c. say to this? He assumes that according to the physiological doctrine, "fever is *nothing more* than gastro-enterite!" He charges the disciples of this doctrine with "having drawn from the magazine of fancy for a theory of fever," and then triumphantly asks, "will the corruscations of a fervid imagination eclipse the sober splendour and guiding radiance of a just experience?" (!) He informs us that "the disciples of Broussais in France, differ on the exact site of the inflammation in the intestinal tube. Louis, in his work entitled Recherches Anatomiques, Pathologiques et Therapeutiques sur la maladie connue sous le nom gastro-enterite, &c. says, that in every case of fever, the elliptical plates of the bowels are the seat of lesion. 'De toutes ces lesions une seule étant constante, ayant lieu chez tous les sujets, je veux parler de l'alteration de plaques elliptiques de l'intestin grêle, &c.'* Others assert, that the glands of Peyer and Brunner are the seat of the lesion, whilst some state that fever is altogether dependent on follicular ulceration." If M. Louis will not admit the accuracy of the anatomical distinctions pointed out in this quotation, he will at least be somewhat surprised at being classed among the disciples of Broussais. Had Dr. Harrison taken the trouble to ascertain with precision, what are the glands of Peyer and Brunner, the elliptical plates of Louis, the mucous follicles of the intestines, he might have been led to suspect that this argument, which he appears to think is destined to give the *coup de grace* to the physiological doctrine, is not very overwhelming. Indeed, it will be somewhat ludicrous if it should turn out as we shrewdly suspect it may, that the elliptical plates of Louis consist of the glands of Peyer in a state of engorgement and ulceration, and that Peyer's glands are nothing more than mucous follicles, the follicules agminées of the French pathologists. Were Dr. Harrison an obscure practitioner, or had his observations been issued as an ephemeral pamphlet, and thus likely to have but a limited circulation, we should have passed them over unnoticed, as we have many other similar attacks upon the physiological doctrine. But Dr. Harrison is one of the medical magnates of the west; his paper has had currency given to it, by its insertion in one of the most respectable journals in this country, (the Baltimore Medical and Surgical Journal, No. 2,) and we should therefore be recreant to our trust were we to allow it to pass without comment, calculated as we conceive it to be, neither to inculcate correct information at home, nor elevate the character of the profession abroad.

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Professor Dunglison's Address delivered to the Graduates of Medicine at the Commencement, March 19th, 1834.—This is an interesting exposition and criticism of the opinion of Lamarck, who maintains, that the habits of an animal are not dependent upon its organization; but on the contrary, its habits, mode of life, and those of its ancestors, have, in the succession of ages, determined the form of its body, the number and condition of its organs, and the functions and faculties it enjoys. This able address has been published by the graduates and students.

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The Value of a great Medical Reputation, with Suggestions for its Attainment; a Lecture, Introductory to the Summer Course of the Medical Institute. By J. K. Mitchell, M. D. Lecturer on Chemistry. An interesting subject well treated.

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University of Pennsylvania.—The number of students in this institution during the session 1833–4, was 860; of which, 431 were medical students.

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Medical Department of the University of Maryland.—The number of students, exclusive of graduates of other schools and officers of the army and navy, was 143.

* Paris, 1829, p. 449, tom. 1.